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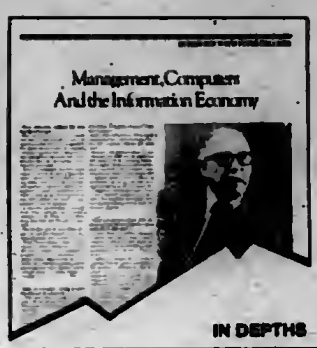

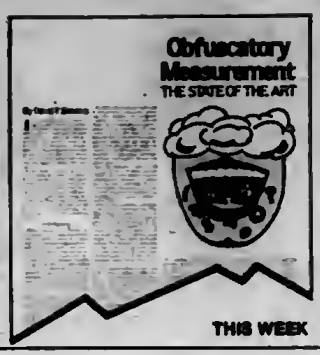

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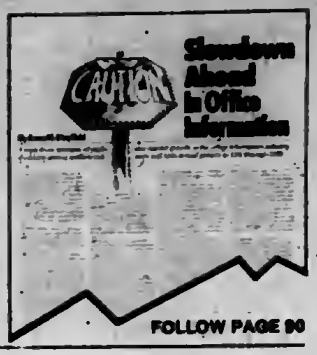

FOLLOW PAGE 90

NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Framingham, Mass., and additional mailing offices ©1980 by CW Communications, Inc.

Vol. XIV, No. 20 May 19, 1980 $1.00 a copy; $30/year

Users Rate Amdahl First, Honeywell Last

By E. Drake Lundell Jr.
CW Staff

DELRAN, N.J. — Amdahl Corp. computers are the tops and those from Honeywell, Inc. are the bottom in terms of user satisfaction.

That's what Datapro Research Corp. found in the most extensive survey of user satisfaction with computers ever undertaken in the U.S.

Interestingly, users of computers compatible with IBM software — machines from Amdahl, Magnuson Computer Systems and the ill-fated Itel Corp. — all expressed higher levels of satisfaction with their equipment than did users that have stayed in the IBM fold. In addition, IBM users are more dissatisfied today than they were five years ago, Datapro analysts noted.

In almost every category of the survey, Amdahl users rated their systems higher and Honeywell users rated their systems lower than did users of any other mainframes currently being offered in the U.S.

The survey — which covered 3,885 systems installed at 2,006 user sites — also showed that the base of users with IBM or IBM software-compatible systems plans the greatest spending increases during the coming year and that this group tends to be the most active in such emerging areas as data base and data communications applications.

This report is based on statistics compiled by Datapro Research Corp.'s Editorial Division, headed by Elizabeth F. Severino. Complete charts of user ratings are on Pages 10 through 16.

The study also delineated purchase plans by the various users for the coming year and rated the most significant advantages and disadvantages users found with their particular models of computers.

Users expressed their overall satisfaction in two ways. First, they rated their overall satisfaction with their systems on a scale of 0 to 4 with 4 being the highest. Second, they answered "yes" or "no" when asked whether they would recommend their systems to others.

In overall satisfaction, Amdahl systems rated a 3.6, the highest in the survey, while Honeywell systems came in at 2.9, the lowest except for International Computers, Ltd. (ICL). ICL machines, which consist of old Singer System 10 equipment that ICL took over when Singer exited the business, were rated 2.6.

On the question of whether users would recommend their systems to others, Honeywell scored the highest with those users that would *not* make

(Continued on Page 4)

Scorecard

On a scale of 1 to 4, with 4 the highest, users voted their overall satisfaction as follows:

Amdahl	3.6
Magnuson	3.5
DEC	3.3
NAS (Itel)	3.2
CDC	3.1
Univac	3.1
NCR	3.0
IBM	3.0
Burroughs	3.0
Honeywell	2.9

Branscomb Hints IBM to Back X.25

By Phil Hirsch
CW Washington Bureau

DETROIT — IBM may be preparing to announce support within the U.S. for X.25, the packet network communications protocol standard.

That was implied here last week in a speech given by IBM Vice-President and Chief Scientist Dr. Lewis M. Branscomb to the International Communications Association (ICA).

"It is IBM's objective to provide the capability of attaching selected products to public data networks with [the] X.25 . . . interface," Branscomb said. After pointing out that the company already offers X.25-compatible products in Canada, France, West Germany and The Netherlands, he added that an "announcement of attachment capability supporting additional products or functions or for other networks with X.25 interfaces will be based on technical and business judgments and the needs of our customers."

His remarks about X.25 were made during a broad-brush survey of "Computer Technology in the '80s," which stressed the idea that the computer potentially can solve many of the nation's current economic woes.

"Finding more productive ways to do things is the most important single solution to the complex problems our society faces — from energy shortages to inflation, declining production and unsettled economies. And surely, the computer is the most effective productive engine of our time," Branscomb said.

The rapidly declining cost of com-

(Continued on Page 8)

Top IBM Execs Support GOP With Their Cash

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — With plenty of IBM influence already in place in the present Democratic Administration, top IBM executives have turned their attention — and turned over their dollars — to the Republican cause.

According to Federal Election Commission (FEC) records — current only through last fall — top IBMers have not contributed at all to Democratic

(Continued on Page 8)

Wide World Photos

End of Ordeal

Following their arrival at Key West, Fla., these Cuban refugees encountered a remote terminal system set up to aid in processing and relocating the new immigrants. Story on Page 19.

IBM Computerworld
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Second-class postage paid at Framingham, Mass., and additional mailing offices PN129420. Published weekly (except: a single combined issue for the last week in December and the first week in January) by CW Communications/Inc. Copyright 1980 by CW Communications/Inc. All rights reserved. ISSN 127-420. Reproduction of material appearing in Computerworld is forbidden without written permission. Send all requests to Marion Kibbee.

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Computerworld can be purchased on 35 mm microform through University Microfilms Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. Computerworld is indexed: write to Circulation Dept. for subscription information.

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POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 375 Cochituate Road, Framingham, MA 01701.

First Offering: VM/PE

Amdahl Opens Up Software Sales

By Marcy Rosenburg
CW Staff

SUNNYVALE, Calif. — Amdahl Corp. will offer its internally developed software for the first time to IBM 370 and 30 series sites without requiring that they also have Amdahl 470 series hardware installed.

The plug-compatible manufacturer's first offering to this market will be the Virtual Machine Performance Enhancement (VM/PE) software which, like Amdahl's other software products, was previously available only to users with at least one 470 on-site.

Introduced almost two years ago [CW, Dec. 4, 1978], VM/PE is said to reduce system overhead for IBM Multiple Virtual Storage — OS/VS2 MVS — or Single Virtual Storage — OS/VS2 SVS — operating systems when either runs concurrently with VM/370, IBM's Virtual Machine facility.

Amdahl is aiming its new marketing thrust primarily at VM/370 installations running MVS and, secondarily, at a "small" remaining SVS marketplace it expects will increasingly convert to MVS, a spokesman said.

VM/PE is not geared to IBM 4300 users since it currently does not operate with DOS/VSE.

Shipments July 1

Amdahl will issue VM/PE licenses to non-470 sites beginning June 2, at which time it will release details on terms and conditions, pricing, support and customer education. Shipments are slated to begin July 1.

The spokesman indicated that Amdahl will probably not offer perpetual licenses, but instead charge monthly fees. That has been its software policy for 470 users.

Effective in March, Amdahl raised its monthly lease rate for VM/PE from $1,500 to $1,750 and hiked by between 6.7% and 9.3% two- and four-year leases for 470 processors to stimulate purchases and offset the cost of borrowing to fund its lease program [CW, Jan. 21].

Another round of increases followed in May for leases of some 470 models and for all maintenance fees [CW, May 5], and the firm is again "examining pricing policies" for VM/PE, the spokesman said.

Also under scrutiny is how Amdahl will support IBM installations that license VM/PE. Depending on their number and location, these installations may create a broader geographic distribution of sites than Amdahl's existing field engineering organization can support, the spokesman explained. Amdahl now claims to guarantee two-hour response time to 470 users of VM/PE.

Training Plans

While he was vague about adjustments in pricing and support policies, the spokesman did discuss plans for training new VM/PE customers. As it has done with 470 users, Amdahl will require IBM system users to attend a VM installation workshop before they can obtain the software.

Currently given once a quarter, the two- to three-day course instructs users on the software's technical details and lets them generate a VM system with VM/PE at Amdahl headquarters here. The workshop will cost extra, but fees were not disclosed.

The firm announced it was moving more aggressively into software in 1978 when it said it was developing system control software for the 470 operating system [CW, Nov. 13, 1978]. It launched this new software marketing effort with VM/PE because, it maintained, IBM does not offer an alternative product.

While refusing to comment on this claim, an IBM spokesman said his firm offers the VM/System Extension program product, which reportedly enhances the performance of MVS under VM. VM/SE leases for $1,170/mo.

Describing the market Amdahl hopes to penetrate, the spokesman said domestic IBM sites running VM and those running MVS account for 11% and 50%, respectively, of some 8,000 installed systems of the 370/138 class and larger. The overlap — those installations running both VM and MVS — is the base from which Amdahl expects to "build a software presence," he added.

This thrust for a foothold in the IBM software market closely follows board approval of a definitive merger agreement between Amdahl and Storage Technology Corp. Plans are for the combined company to supply products that attach to both Amdahl and IBM systems, offerings the spokesman said may include future system software to address auxiliary storage utilization as well as operating system performance.

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- **10-40% in SIOs.**

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Users Rank Amdahl CPUs First, Honeywell Last

(Continued from Page 1)

such a recommendation — 41%.

At the same time, 97% of the Amdahl users would recommend their equipment to others, second only to Magnuson users, of which 100% said they would recommend their equipment.

The only other machines scoring ratings over 90% came from Digital Equipment Corp., 92% of whose users would recommend their equipment to others.

Here's how the users rated their mainframe manufacturers on a case by case basis in order of overall satisfaction:

• *Amdahl Corp.:* Almost 30% of the Amdahl base was represented in the study — 44 separate users with a total of 64 mainframes installed. Overall user satisfaction was 3.6, and the firm fell below the 3.0 level only in two rating categories — education (2.8) and documentation (2.9).

Few Amdahl users noted "significant problems" with their systems, while a large percentage noted "significant advantages." Ninety-seven percent would recommend their systems to others, while 3% would not.

While 21% of the Amdahl users plan to replace CPUs this year, 19% will stay with Amdahl and 2% will go elsewhere.

• *Magnuson Computer Systems:* The newness of Magnuson on the computer scene was shown clearly in the figures; only three users rating five total mainframes responded to the survey. While a small sample size, this probably represents about 10% of the total number of installed Magnuson machines.

The users had only a little more than a half-year's experience with their systems, but so far are quite pleased. They gave the machines an overall statisfaction rating of 3.5, and each user said it would recommend the systems to others.

No users in this limited base plan new acquisitions during the coming year.

• *Digital Equipment Corp.:* While this firm is better known in the minicomputer area, 56 users of 71 larger DEC systems participated in the survey, representing a fairly large percentage of the vendor's large system base.

In overall satisfaction, the users rated DEC at 3.3; 92% said they would recommend their systems to others. DEC, however, rated less than 3.0 in several areas including reliability of peripherals (2.9), maintenance responsiveness (2.7) and effectiveness (2.8) and technical support including troubleshooting (2.7), education (2.3) and documentation (2.6). The firm was also rated low in application programs (2.8).

Five percent of the users will upgrade with DEC this year, while 3% will go elsewhere.

• *National Advanced Systems (NAS):* The 37 users with 50 mainframes installed remain relatively happy with their computers in spite of the fact that the original supplier, Itel, went out of the mainframe business.

The users gave their systems a 3.2 overall rating, and 81% said they would recommend them to others. Only in the technical support area — troubleshooting (2.9), education (2.7) and documentation (2.8) — and in reliability of peripherals (2.5) did the users rate NAS below 3.0.

However, it should be noted that 4% of the users plan to replace their computers this year — and not one of these users plans to stay with NAS for the replacements.

• *Control Data Corp.:* Thirty-three CDC users with 46 mainframes installed — about 10% of CDC's U.S. base — responded to the survey, expressing a 3.1 overall satisfaction rate. Eighty-one percent would recommend their systems to others, although the vendor was rated below 3.0 in several categories, including reliability of peripherals (2.6), technical support — trouble-shooting (2.7), education (2.8) and documentation (2.3) — application programs (2.4) and ease of conversion

(Continued on Page 6)

Largest Survey of Its Type

Datapro Research Corp's 1980 "Annual Survey of User Opinion of Computer Systems" represents the largest survey of its type ever undertaken in the U.S. It summarizes the experiences of 4,614 users of mainframes, minicomputers and desktop computer systems.

In all, 14,990 users were contacted by mail for the survey; their names were drawn from selected portions of the *Computerworld* subscriber list. Each installation was contacted twice.

Responses came from 5,337 users. After careful analysis, 4,614 responses were judged valid, resulting in a 31% valid response rate.

In the area of mainframes, reported here this week, 2,006 users rated a total of 3,885 systems of 75 model types from 12 vendor categories (including "other").

Next week, CW will present the results from surveying 2,309 users of 3,437 minicomputer systems of 116 model types in 32 vendor categories (including "other") and 299 users rating 549 desktop and microcomputer systems in 23 models in 18 vendor categories.

Each surveyed user answered 87 questions in 14 different categories about the equipment it had installed — leading to a wealth of information on how users use systems and what they think about them.

Full survey results and an analysis by Datapro researchers is available for $25. Datapro's address is 1805 Underwood Blvd., Delran, N.J. 08075.

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Users of IBM-Type Systems Sophisticated

By E. Drake Lundell Jr.
CW Staff

DELRAN, N.J. – The world of IBM-compatible systems appears to be where the action is in terms of advanced software and new application areas.

In general, users of IBM and IBM-compatible equipment appear to be on the forefront of such new applications as data base and data communications as well as such areas as word processing (WP), distributed data processing (DDP) and transaction processing, according to figures gleaned from Datapro Research Corp.'s 1980 "Annual Survey of User Opinion of Computer Systems."

For example, 90% of the Amdahl users polled already use data base management systems (DBMS) – the highest percentage of DBMS users in the survey. Univac users are also heavy data base users – 66% have DBMS installed – the highest percentage by far in the non-IBM-compatible world.

Users of equipment from National Advanced Systems (NAS), the former Itel Corp. base, are also into data base (58%) and 50% of the IBM users use a DBMS. Burroughs Corp. (46%), Control Data Corp. (45%) and Digital Equipment Corp. (49%) users are heavily committed to DBMS, while the Honeywell, Inc. user base (29%) and the NCR Corp. users (14%) rank much lower.

All of the Magnuson Computer Systems sites polled are using data communications monitors, as are Amdahl (82%) and NAS (73%) users.

Univac users are also sophisticated in this category, with 64% using data communications monitors, ahead of IBM users (57%). Of the other independents, Burroughs leads with 56%, followed by Honeywell (42%), CDC (37%), NCR (28%) and DEC (23%).

Amdahl and DEC are the leaders in WP applications, with 19% of their users indicating they have WP applications on their systems. This is more than double anyone else and is followed by NAS and Burroughs at 8%, IBM, CDC and Univac at 5% and Honeywell at 4%. The other users reported no WP applications.

In the DDP arena, Amdahl again led with 17% of its users reporting some DDP applications. Univac was once again second at 11%, followed by CDC at 10%, DEC and NCR at 9%, IBM at 8% and Burroughs, Honeywell and NAS at 7%.

With 44% of its users also into transaction processing, Amdahl was again first in this category followed, once again, by Univac with 24% of its users doing transaction-processing work. They were followed by IBM (19%), Burroughs (18%), NCR (16%) and DEC (15%).

Next is NAS (14%), followed by Honeywell (11%) and CDC, which has no users doing transaction work.

Most Upgrading In IBM World

By E. Drake Lundell Jr.
CW Staff

DELRAN, N.J. – In terms of software upgrades during the next year, users of IBM and IBM-compatible mainframes will be the most active, according to Datapro Research Corp.'s 1980 "Annual Survey of User Opinion of Computer Systems."

This group of users is generally much more bullish on spending plans than the users of any other manufacturers. For example, 42% of the Amdahl Corp. users surveyed, 40% of the IBM users and 29% of the National Advanced Systems (NAS) users plan to make software purchases from their respective mainframers during the year.

In the non-IBM world, however, 38% of the NCR Corp. users polled by Datapro, 34% of the Digital Equipment Corp. users and 31% of the Univac users have such plans. Less than 30% of all the other users surveyed plan to purchase software from their mainframe manufacturers during the year, running from 25% each for the Burroughs Corp. and Control Data Corp. users to 19% of the Honeywell, Inc. users.

In the field of proprietary software, the buying plans of the IBM-compatible users are even more bullish. Every one of the Magnuson users has such plans, followed by NAS users (76%), Amdahl users (75%) and IBM users (42%).

DEC users will also be heavy buyers of proprietary software; 49% have such plans for the year.

At 36%, CDC users follow the DEC users with purchasing plans, trailed by Burroughs (31%), Univac (29%) and NCR (26%). Once again Honeywell users are at the bottom of the pile when it comes to purchasing plans;

(Continued on Page 6)

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Honeywell Rated the Lowest in User Satisfaction

(Continued from Page 4)

(2.4).

Twenty-three percent will upgrade with CDC this year, while a fairly high 14% will go to another vendor.

• *Univac:* The 130 Univac users with 181 systems installed, about 5% of the Univac base, also rated their overall satisfaction at 3.1, but only 73% would recommend the systems to other users.

The users rated the vendor below 3.0 in reliability of peripherals (2.9) and in technical support, including troubleshooting (2.8), education (2.6) and documentation (2.4). The users also rated the firm low in application programs (2.6) and ease of conversion (2.8).

In spite of those problems, however, the 19% of the users surveyed that plan to replace CPUs this year will stick with Univac. None will go to other vendors.

• *NCR Corp.:* With 162 mainframes installed, 151 NCR users gave the firm and its equipment an overall 3.0 rating. Eighty-two percent said they would recommend their systems to others.

In addition, 34% plan to replace their mainframes this year and only 9% will leave the NCR fold.

NCR rated below 3.0 in four categories, including the ever-present technical support, including troubleshooting (2.4), education (2.6) and documentation (2.5), and in the area of application programs (2.8).

• *IBM:* The largest of the mainframers was represented by the largest number of users in the survey, as would be expected, with 1,149 users rating a total of 1,776 systems they have installed.

IBM tied with NCR with an overall satisfaction rating of 3.0, but slightly fewer of its users (80%) would recommend their systems to other users. And although technical support is supposed to be an IBM forte, users rated IBM below 3.0 for troubleshooting (2.7), education (2.7) and documentation (2.7).

Furthermore, IBM was also ranked below 3.0 in the area of application programs (2.8) and garnered a fairly consistent score of about 3.0 in other areas.

Of the IBM users, however, 25% plan to replace their CPUs and most will stick with IBM for the new systems they install this year.

• *Burroughs Corp.:* The 252 Burroughs users — with 338 CPUs installed — also rated their overall satisfaction at 3.0, but only 73% would recommend that others buy the same systems.

Burroughs users rated their systems high in ease of operation and in operating systems and compilers, but gave the vendor low ratings for reliability of peripherals (2.5), maintenance responsiveness (2.7) and effectiveness (2.4) and in the technical support areas of troubleshooting (2.2), education (2.3) and documentation (2.1). Application programs (2.5) from Burroughs also rated low.

However, 29% of the users plan to upgrade with Burroughs this year, while only 4% will go elsewhere.

• *Honeywell:* The 128 Honeywell users with 146 systems installed expressed the highest degree of dissatisfaction with their systems of any users of any U.S. mainframer, giving the firm a 2.9 overall rating.

Only 59% of the Honeywell users would recommend their systems to others. Honeywell users are expressing their dissatisfaction with their new system orders — twice as many will go with other manufacturers as will stay with Honeywell.

Honeywell users rated the firm and its equipment below 3.0 in several areas, including reliability of peripherals (2.7), maintenance responsiveness (2.7) and effectiveness (2.8), troubleshooting (2.5), education (2.5), documentation (2.5), applications programs (2.7) and ease of conversion (2.9).

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Most Upgrading In IBM World

(Continued from Page 5)

only 14% plan to purchase proprietary software in 1980.

Although already heavily into data communications, 69% of the Amdahl users plan to expand their data communications operations this year, followed by 62% of the NAS users. The next highest action in this area will come from the DEC users with 59% having plans, Burroughs users (56%), CDC users (54%), Univac users (53%) and NCR users (51%). Only 38% of the Honeywell users plan to spend in this area during 1980.

Amdahl users also lead with spending plans for distributed data processing (DDP); 42% plan to expand their DDP operations in 1980 — almost twice as the number of the 22% of IBM users that plan more activity in this area.

DEC (18%), Univac (17%), CDC (16%), Burroughs (15%), NAS (15%), NCR (13%) and Honeywell (12%) users follow with DDP plans for the year.

Integrating word processing into DP operations is a hot button in the business, and once again the Amdahl users seem to be on the forefront of activity — 28% have plans to spend money on such systems during the year. However, interest is pretty low among most other users, except for DEC users, 26% of which plan purchases in the area.

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Company	
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Telephone	Computer Model

IBM Execs Fatten the Republican Coffers

(Continued from Page 1)

candidates, but have been backing Republicans heavily in the early part of the 1980 races.

Like many analysts and others, however, the IBMers have managed to back the wrong horses; none had contributed to the campaign of Ronald Reagan, who now appears to have the nomination all but sewn up.

It might not be surprising that IBMers have not given at all to the Democratic coffers. The influence of the individuals and the corporation are already evident in the Carter Administration, and top IBMers have close ties to the Kennedy camp.

In the Carter Administration, IBM is well-represented by Secretary of Defense, Harold Brown and Secretary of Health, Education and Welfare Patricia Harris, both former directors of IBM. Ex-Secretary of State Cyrus Vance and ex-Assistant Secretary of State Warren Christopher also had IBM ties, as did many others in the Carter Administration, either currently or in the past.

In addition, while ex-IBM Chairman Thomas Watson Jr. is serving the Carter Administration as ambassador to the USSR, he has close ties to the Kennedy camp as well and has often skied with the senator in Stowe, Vt.

With contacts with the Democrats pretty solid, this fall IBM executives and directors apparently turned their attention to the Republican side of the political apparatus.

Like many big business executives, however, many of the IBMers were apparently captivated by John Connally, who was able to garner more dollars from the boardrooms of America — and from IBM directors — than votes from the people of the country.

IBM Backers

Prominent IBM backers of Connally early in the primary races were company directors Stephen D. Bechtel Jr., John N. Irwin II and retired IBM Chairman T. Vincent Learson, all of whom contributed $1,000 to Connally's campaign chest. $1,000 is the largest individual contribution allowed by federal election laws.

Bechtel, chairman of the San Francisco-based Bechtel Group of engineering and construction companies, also contributed $1,000 to both Baker and Bush. His wife contributed a like sum to Connally.

Following a trend by IBM directors to spread their money among several Republican candidates, Irwin, a New York attorney in the firm of Patterson, Belknap, Webb & Tyler, also gave Bush's campaign $1,000 and kicked in $250 for perennial dark horse Sen. Charles Percy (R.-Ill.).

George Bush picked up widespread if not large support from a number of IBM directors, including Carla Hills, former U.S. Secretary of Housing and Urban Development, who contributed $1,000; Amory Houghton Jr., chairman of Corning Glass Works, Inc., who put up $750; and William T. Coleman, who contributed $200.

Coleman, a partner in the law firm of O'Melveny & Myers, Washington, D.C., Los Angeles and Paris, hedged his political bets in the Republican primaries, backing not only Bush but also Sen. Robert Dole of Kansas with a $500 contribution. Recently turned Independent John Anderson received $600.

Early campaign-favorite Baker also picked up several small contributions from IBM directors, including $250 from Hills and $200 from IBM Chairman Frank T. Cary.

Other contributions attributed by FEC to IBM directors included $1,000/head Republican dinners attended by Coleman, Houghton and Mr. and Mrs. Bechtel.

In addition, two members of the IBM Advisory Board made early campaign contributions to Republican candidates. John Clifford Folger, chairman of Folger Nolan Fleming Douglas, Inc., Washington, D.C., investment bankers, donated $250 to Baker. George L. Hinman, partner in the Binghamton, N.Y., law firm of Hinman, Howard & Kattel, contributed $1,000 to the Connally campaign.

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IBM May Back X.25 Protocol

(Continued from Page 1)

puting since the 1950s at a time when "the cost of any activity reflecting human labor has increased 10% per year," is one measure of the computer's national economic significance, Branscomb pointed out.

Another measure is the growth of computerization. "Today, in the U.S. work force, there is one computer terminal for every 48 employees. Among IBM customers, there are 25 employees per terminal. And within IBM itself, we have 4.8 employees per terminal.

"By 1986, it is estimated there will be a terminal for every 10 employees in the U.S. work force, one for every six of our customers' employees and one for every two IBMers," he said.

But in addition to declining cost and wider use, improvements in system architecture have greatly increased the computer's ability to cut costs by making it possible to "pattern an information-handling system after the true structure of the using organization [rather than] the familiar structure of a firm's organization chart," Branscomb said.

Distributed processing is the latest implementation of this concept, he added, predicting that time-shared remote processing will be supplanted "gradually during the '80s by distributed networks."

Branscomb expects the improvements of the past several years to continue during the coming decade, partly because of a "continued, steady increase" in the number of memory bits and logic circuits per chip.

One result of this development in the '70s was the introduction of intelligent terminals capable of formatting and editing messages as well as doing some local processing. Host processor requirements, along with response time, were reduced, he pointed out.

In addition, "transmissions between host and terminal are now complete messages, sent at high speed. The network designer had . . . greater opportunity to optimize network capacity by managing the flow of information."

Digital private automatic branch exchanges are another recent implementation of the microprocessor-equipped terminal. They "open the door to integrated voice and data systems, intermingling information from [telephone] handsets, keyboards and other sources as a single stream of bits."

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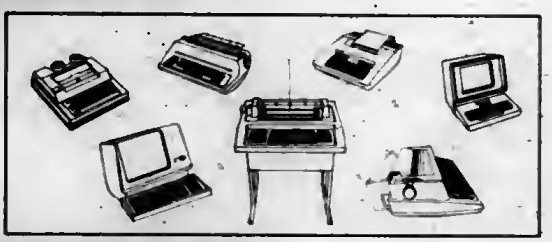

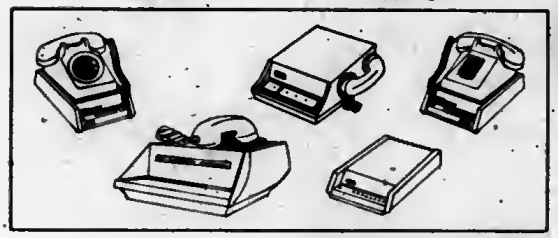

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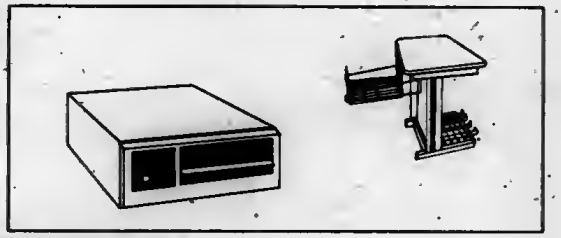

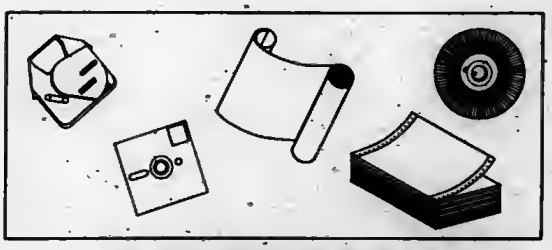

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Users Rate the Manufacturers . . .

Survey Item / Manufacturer and Model	Amdahl	Burroughs	Control Data	DEC	Honeywell	IBM	ICL	Magnuson	NASCO (NAS)	NCR	Unisys	All Other Mainframes
Principal Applications (%)												
Accounting	70	91	42	45	58	66	83	33	72	64	88	50
Construction	7	2	7	0	2	3	0	0	3	1	3	0
Education	14	18	41	36	18	11	10	0	8	3	15	0
Government	16	13	21	22	17	12	0	0	12	8	22	0
Manufacturing	32	14	19	6	23	26	28	0	30	13	26	0
Payroll/Personnel	61	53	30	33	49	55	22	33	57	30	58	25
Service Bureaus	23	17	17	31	10	16	24	33	31	7	10	0
Transportation	12	2	3	2	4	7	10	0	2	2	11	0
Word Processing	19	8	5	19	4	8	0	0	8	0	5	0
Banking/Finance	13	30	3	16	7	17	4	67	7	21	6	0
Distributed Processing	17	7	10	9	7	8	4	0	7	9	11	0
Engineering/Scientific	34	8	28	31	12	14	0	0	10	0	20	25
Insurance	14	8	6	10	7	16	10	0	7	2	4	25
Medical/Health Care	7	10	6	14	16	8	0	0	22	7	8	0
Retail	7	8	0	0	4	8	7	0	8	8	8	0
Transaction Processing	44	18	0	15	11	19	11	0	14	16	24	0
Utilities-Power	10	4	0	3	3	3	4	0	12	9	7	0
Other	16	13	7	20	10	15	4	0	28	16	11	50
Hardware Configuration												
No. of CPUs	71	368	47	45	157	1,708	21	5	9	182	191	4
No. of Workstations (avg.)	126.0	35.0	53.1	38.1	22.6	41.5	8.0	4.6	49.5	11.8	49.6	301.7
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	42	25	25	34	19	40	7	0	29	38	31	0
Proprietary Software	75	31	36	49	14	42	21	100	76	25	29	0
Expanded Datacomm	69	56	54	59	38	43	22	33	62	51	53	25
Distributed Processing	42	15	16	18	12	22	0	0	16	13	17	0
Integrated Word Processing	28	11	6	26	4	10	4	0	14	6	10	0
Other	10	8	10	21	2	3	14	0	4	4	4	0

Survey Item / Manufacturer and Model	Amdahl	Burroughs	Control Data	DEC	Honeywell	IBM	ICL	Magnuson	NASCO (NAS)	NCR	Unisys	All Other Mainframes
Significant Advantages (%)												
Users happy with response time	46	40	44	71	37	42	58	33	61	48	58	0
System easy to expand/reconfigure	38	51	42	61	43	28	48	67	48	53	53	0
System costs less than expected	25	8	16	3	4	8	4	33	11	16	8	0
Programs/data compatible, as vendor promised	66	43	44	46	27	42	27	100	71	52	33	25
Terminals/peripherals compatible, as vendor promised	66	41	32	33	14	30	0	67	78	32	31	25
System is power/energy efficient	46	9	17	19	9	10	17	100	60	20	17	0
Productivity aids help us keep programming costs down	23	30	8	53	17	21	14	33	8	16	27	0
Database language effective	19	28	15	28	12	9	4	0	6	13	22	50
Delivery and/or installation of equipment was ahead of schedule	37	4	11	15	5	11	7	33	56	11	19	0
Delivery and/or installation of software was ahead of schedule	10	3	3	7	1	5	0	0	6	6	9	0
Other	4	5	4	11	11	4	14	0	0	3	4	25
Technical support:												
Trouble-shooting	31	22	27	27	25	27	26	37	29	24	28	25
Education	28	23	28	23	25	27	23	37	27	26	25	23
Documentation	29	21	23	26	26	27	22	37	26	25	24	15
Ease of programming	34	34	31	37	31	30	27	38	32	30	30	35
Ease of conversion	35	31	24	32	26	30	22	35	24	31	28	28
Overall satisfaction	36	30	31	33	29	30	26	35	32	30	31	33

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. . . And Their Mainframes

Survey Item / Manufacturer and Model	Amdahl 470/V6	Amdahl 470/V6	Amdahl 470/V6-II	Amdahl 470/V7	Amdahl 470/V8	Burroughs B 6700	Burroughs B 6700	Burroughs B 6700	Burroughs B 6700	Burroughs B 6700	Burroughs B 7700	Burroughs B 1800	Burroughs B 2800
Principal Applications (%)													
Accounting	75	54	70	83	67	64	40	56	67	38	75	42	16
Construction	8	8	20	0	0	5	0	0	0	13	0	3	0
Education	16	8	30	17	0	11	0	11	7	13	50	14	0
Government	16	8	40	17	0	11	13	11	0	26	26	16	8
Manufacturing	33	31	30	33	33	20	7	6	0	13	0	22	16
Payroll/Personnel	58	54	60	100	33	52	47	50	43	75	76	46	23
Service Bureaus	8	23	20	33	33	16	40	11	7	26	0	13	31
Transportation	0	8	20	0	33	2	7	0	7	0	0	0	0
Word Processing	8	23	30	0	33	0	0	6	7	13	26	8	8
Banking/Finance	8	31	10	17	0	23	47	44	43	25	26	14	62
Distributed Processing	8	31	30	17	0	2	13	0	0	13	0	6	16
Engineering/Scientific	25	31	50	33	33	5	0	6	7	38	50	0	0
Insurance	8	23	40	0	0	0	7	0	7	13	0	10	0
Medical/Health Care	8	8	20	0	0	11	7	6	7	13	26	3	0
Retail	8	8	0	17	0	9	7	0	14	0	0	3	8
Transaction Processing	25	31	50	33	33	16	7	11	14	13	50	16	15
Utilities-Power	8	15	10	17	0	5	0	0	0	13	25	6	0
Other	8	31	10	0	33	—	20	17	14	13	26	14	8
Hardware Configuration													
No. of CPUs	22	17	13	6	11	86	17	36	16	16	6	84	30
No. of Workstations (avg.)	80.2	52.2	252.5	163.0	81.8	44	7.6	6.6	36.6	47.0	110.0	10.0	3.6
Planned Acquisitions/Implementations for 1980 (%)													
Additional software from manufacturer	25	31	70	50	33	18	27	11	36	25	25	32	0
Proprietary Software	75	62	90	83	67	18	33	26	29	38	25	22	38
Expanded Datacomm	58	77	100	75	33	43	93	56	71	38	75	67	38
Distributed Processing	50	38	40	50	33	20	7	22	21	13	25	17	6
Integrated Word Processing	25	23	40	17	33	4	0	0	0	13	50	10	15
Other	8	8	0	0	33	0	7	6	7	0	25	3	0

Survey Item / Manufacturer and Model	Amdahl 470/V6	Amdahl 470/V6	Amdahl 470/V6-II	Amdahl 470/V7	Amdahl 470/V8	Burroughs B 6700	Burroughs B 6700	Burroughs B 6700	Burroughs B 6700	Burroughs B 6700	Burroughs B 7700	Burroughs B 1800	Burroughs B 2800
Significant Advantages (%)													
Users happy with response time	42	69	50	33	33	30	27	28	29	50	0	58	46
System easy to expand/reconfigure	75	53	30	28	33	43	53	78	36	50	75	81	77
System costs less than expected	8	31	20	33	33	5	0	0	7	25	25	14	0
Programs/data compatible, as vendor promised	75	8	60	100	67	23	33	44	43	25	50	47	54
Terminals/peripherals compatible, as vendor promised	58	70	70	75	67	11	20	56	21	50	100	44	31
System is power/energy efficient	33	46	50	33	33	16	7	0	0	0	0	17	23
Productivity aids help us keep programming costs down	8	23	50	0	33	20	33	22	14	63	25	64	23
Database language effective	25	8	30	0	33	16	7	17	7	63	50	36	0
Delivery and/or installation of equipment was ahead of schedule	42	31	30	50	33	9	7	6	7	13	0	13	0
Delivery and/or installation of software was ahead of schedule	8	8	20	17	0	2	7	0	0	13	0	10	0
Other	8	0	10	0	0	9	20	17	0	13	0	6	0
Technical support:													
Trouble-shooting	30	32	36	32	27	21	21	24	20	28	20	24	20
Education	28	27	32	28	27	22	27	23	22	21	27	25	20
Documentation	29	28	34	30	23	19	23	22	21	23	20	22	23
Ease of programming	33	34	36	25	40	34	35	34	32	35	35	35	33
Ease of conversion	32	36	35	33	37	33	32	30	31	31	33	34	32
Overall satisfaction	33	38	34	37	37	29	29	29	29	31	33	32	30

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With Machines From Amdahl to Univac . . .

Survey Item	Burroughs B 3800	Burroughs B 4800	Burroughs B 6800	Burroughs B 7800	Burroughs (other models)	Control Data Cyber 170	Control Data Omega 480	Control Data 3000 Series	Control Data 6000, 7000	Control Data (other models)	DEC DECsystem-10	DEC DECsystem-20
Principal Applications (%)												
Accounting	50	40	69	100	22	33	86	17	40	33	38	50
Construction	0	0	0	0	0	0	0	0	0	33	0	0
Education	14	0	40	25	22	80	0	17	40	100	38	32
Government	7	7	13	25	11	17	0	33	20	33	33	13
Manufacturing	14	27	25	25	0	17	43	33	0	0	6	5
Payroll/Personnel	50	27	66	100	33	33	29	33	20	33	38	26
Service Bureaus	7	20	0	25	22	25	29	33	0	0	33	29
Transportation	0	7	6	0	0	0	0	17	0	0	0	3
Word Processing	0	0	13	25	0	8	0	17	0	0	17	21
Banking/Finance	43	27	0	0	44	0	14	0	0	0	11	21
Distributed Processing	14	13	6	50	0	0	0	0	20	33	17	0
Engineering/Scientific	0	7	0	0	0	67	0	33	60	67	33	29
Insurance	0	7	0	25	0	0	14	17	0	0	6	13
Medical/Health Care	7	13	13	25	0	0	14	17	0	0	22	5
Retail	14	0	13	0	0	0	0	0	0	0	0	0
Transaction Processing	36	20	13	25	0	0	0	0	0	0	11	18
Utilities-Power	0	0	0	0	0	0	0	0	0	0	0	5
Other	0	27	31	0	0	8	29	0	0	0	22	18
Hardware Configuration												
No. of CPUs	18	32	24	7	12	19	7	9	7	8	38	7
No. of Workstations (avg.)	30.2	0	41.1	133.5	17.7	46.8	15.3	7.0	177.4	19.5	37.5	39.6
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	57	27	38	25	11	42	29	0	20	33	33	34
Proprietary Software	50	40	25	25	22	58	71	0	20	33	39	58
Expanded Datacomm	79	73	50	75	11	58	57	17	40	100	62	55
Distributed Processing	14	13	13	25	0	25	0	0	20	33	22	13
Integrated Word Processing	0	7	0	50	0	17	14	0	0	0	28	24
Other	0	13	19	0	0	0	14	17	20	0	39	3

Manufacturer and Model / Survey Item	Burroughs B 3800	Burroughs B 4800	Burroughs B 6800	Burroughs B 7800	Burroughs (other models)	Control Data Cyber 170	Control Data Omega 480	Control Data 3000 Series	Control Data 6000, 7000	Control Data (other models)	DEC DECsystem-10	DEC DECsystem-20
Significant Advantages (%)												
Users happy with response time	57	33	63	75	22	58	29	67	0	67	78	63
System easy to expand/reconfigure	50	60	25	25	11	42	29	33	40	67	50	71
System costs less than expected	0	0	25	0	0	17	14	17	0	33	0	5
Programs/data compatible, as vendor promised	64	47	44	75	11	58	71	17	40	33	44	47
Terminals/peripherals compatible, as vendor promised	43	40	47	75	0	50	71	0	40	0	33	32
System is power/energy efficient	0	33	19	0	0	17	71	0	0	0	17	21
Productivity aids help us keep programming costs down	29	27	50	25	0	8	0	0	0	33	50	55
Database language effective	14	7	56	75	0	8	0	0	0	67	39	16
Delivery and/or installation of equipment was ahead of schedule	0	0	0	0	0	25	14	17	0	0	17	13
Delivery and/or installation of software was ahead of schedule	0	0	6	0	0	0	0	17	0	0	11	3
Other	0	7	0	0	0	0	0	0	20	0	22	0
Technical support:												
Trouble-shooting	2.3	2.1	2.4	2.3	1.8	2.9	2.2	3.2	2.7	2.5	2.6	2.8
Education	2.5	2.3	2.7	2.3	1.8	2.8	2.3	2.8	2.3	1.5	2.0	2.5
Documentation	2.3	1.8	2.2	2.0	1.8	2.5	2.2	2.5	2.0	2.5	2.6	2.6
Ease of programming	3.4	3.4	3.4	3.8	2.9	2.8	3.2	3.0	3.2	3.0	3.8	3.6
Ease of conversion	3.7	3.2	3.1	2.3	2.3	2.6	3.2	2.8	3.5	0.0	3.2	3.1
Overall satisfaction	3.1	2.8	3.3	3.0	2.3	3.0	2.8	3.0	3.4	3.3	3.3	3.3

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. . . Users Rate Their Mainframes

Survey Item / Manufacturer and Model	Honeywell Level 64	Honeywell Level 66	Honeywell Series 200	Honeywell 2000	Honeywell 6000	Honeywell, Xerox, Sigma Series	Honeywell (other models)	IBM 360/30	IBM 360/40	IBM 360/50	IBM 360/65	IBM 360 (other models)
Principal Applications (%)												
Accounting	78	68	59	85	33	29	58	63	61	55	69	80
Construction	4	3	0	4	0	0	0	11	3	0	0	0
Education	7	19	18	4	17	43	25	13	15	9	15	20
Government	7	25	0	8	66	14	0	11	15	9	15	40
Manufacturing	41	25	18	44	0	14	17	32	25	18	15	0
Payroll/Personnel	70	63	41	59	17	43	50	47	49	55	62	60
Service Bureaus	7	28	12	4	0	14	8	26	19	55	46	20
Transportation	19	3	0	4	0	0	0	3	0	9	15	0
Word Processing	0	9	0	4	0	14	0	0	2	5	8	20
Banking/Finance	4	13	12	0	17	0	0	13	22	5	23	0
Distributed Processing	11	16	0	8	0	14	0	5	3	0	8	0
Engineering/Scientific	0	16	0	4	0	29	33	3	5	14	0	100
Insurance	11	9	24	8	0	0	0	5	5	9	8	0
Medical/Health Care	19	6	24	0	17	14	25	8	7	5	0	20
Retail	11	0	12	4	0	0	0	11	5	0	15	0
Transaction Processing	15	25	6	8	0	14	8	13	14	0	31	10
Utilities-Power	0	6	0	0	0	14	0	3	2	0	0	0
Other	0	22	12	19	17	0	0	21	7	14	8	0
Hardware Configuration												
No. of CPUs	27	43	18	28	18	8	17	38	61	23	17	6
No. of Workstations (avg.)	10.8	43.2	2.3	2.4	27.3	53.9	18.0	0.6	4.9	52.1	29.0	26.0
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	33	41	6	11	17	14	8	26	31	27	0	20
Proprietary Software	11	38	6	4	0	14	25	21	32	41	23	40
Expanded Datacomm	44	75	8	26	50	29	33	16	38	36	38	60
Distributed Processing	15	19	0	4	33	14	0	11	10	14	46	20
Integrated Word Processing	0	25	0	4	0	0	0	3	5	5	23	20
Other	4	0	6	4	0	0	0	11	0	5	8	0

Survey Item / Manufacturer and Model	Honeywell Level 64	Honeywell Level 66	Honeywell Series 200	Honeywell 2000	Honeywell 6000	Honeywell, Xerox Sigma Series	Honeywell (other models)	IBM 360/370	IBM 360/40	IBM 360/50	IBM 360/65	IBM 360 (other models)
Significant Advantages (%)												
Users happy with response time	37	53	24	30	33	57	25	28	24	18	46	20
System easy to expand/reconfigure	70	75	6	22	83	29	17	18	19	32	15	0
System costs less than expected	7	0	6	15	0	0	0	24	10	14	31	0
Programs/data compatible, as vendor promised	48	38	18	63	33	14	8	21	22	23	38	0
Terminals/peripherals compatible, as vendor promised	7	28	0	0	17	29	17	5	7	23	31	0
System is power/energy efficient	19	9	18	0	17	0	0	0	0	5	0	0
Productivity aids help us keep programming costs down	22	34	6	8	0	29	17	3	3	18	23	20
Database language effective	11	44	0	0	17	14	0	0	3	5	8	0
Delivery and/or installation of equipment was ahead of schedule	11	3	6	4	0	14	0	5	3	5	8	20
Delivery and/or installation of software was ahead of schedule	4	0	0	4	0	0	0	0	3	5	0	0
Other	4	6	6	15	0	29	17	0	10	0	0	0
Technical support:												
Trouble-shooting	2.6	2.5	2.9	2.4	2.0	3.0	2.4	2.7	2.6	2.7	2.2	2.2
Education	2.3	2.4	2.1	2.3	2.5	2.9	2.7	2.8	2.5	2.5	2.2	2.8
Documentation	2.0	2.5	2.3	2.3	2.5	2.9	3.1	2.8	2.6	2.9	2.6	2.2
Ease of programming	3.1	3.0	3.1	2.9	2.8	3.4	3.1	2.9	3.0	2.6	2.8	3.0
Ease of conversion	2.7	2.9	2.5	2.7	2.3	2.7	2.2	2.9	2.5	2.8	2.5	2.5
Overall satisfaction	2.9	3.1	2.6	2.8	2.5	3.4	3.0	2.8	3.0	2.9	2.7	2.5

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Users Rate Their Mainframes . . .

Survey Item \ Manufacturer and Model	IBM 3033	IBM 4331	IBM 4341	ICL System 10	ICL 1900 & 2900 Series	Magnuson M-80/3	NASCO (fka) AS/3 & AS/3-5	NASCO (fka) AS/5 & AS/5-3	NASCO (fka) AS/5-703	NASCO AS/6	NCR Century 101 thru 200	NCR Century 201 thru 300
Principal Applications (%)												
Accounting	57	55	34	86	80	33	57	67	75	78	78	50
Construction	1	2	0	0	0	0	0	0	0	11	2	0
Education	2	11	0	0	20	0	11	0	0	22	6	0
Government	11	2	0	0	0	0	0	12	25	11	2	0
Manufacturing	32	36	34	36	20	0	34	40	25	22	26	0
Payroll/Personnel	52	43	34	43	20	33	57	67	25	67	60	3
Service Bureaus	12	11	0	7	0	0	11	0	25	33	15	6
Transportation	11	2	0	0	20	0	0	6	0	0	4	0
Word Processing	6	2	0	7	0	0	11	0	0	22	0	0
Banking/Finance	27	11	34	7	0	67	0	27	0	0	7	6
Distributed Processing	15	2	34	7	0	0	11	0	0	11	4	0
Engineering/Scientific	21	6	34	0	20	0	11	6	0	22	0	0
Insurance	21	4	0	0	0	0	11	0	0	11	2	0
Medical/Health Care	7	7	0	0	0	0	11	6	25	22	7	6
Retail	6	11	0	14	0	0	11	0	0	11	7	0
Transaction Processing	24	20	0	21	0	0	11	20	0	22	7	0
Utilities-Power	6	2	0	7	0	0	11	0	25	11	7	6
Other	15	20	34	7	0	0	100	0	0	11	17	0
Hardware Configuration												
No. of CPUs	126	56	100	37	5	5	90	20	6	6	47	15
No. of Workstations (avg.)	178.2	8.0	27.0	3.1	14.0	4.8	67.2	2.6	4.2	134.0	1.28	21.4
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	54	48	67	14	0	0	22	12	25	56	17	57
Proprietary Software	57	39	100	21	20	100	89	60	75	78	15	42
Expanded Datacomm	77	46	67	42	20	33	67	60	75	44	32	42
Distributed Processing	40	26	67	0	0	0	34	12	0	11	11	17
Integrated Word Processing	15	7	33	7	0	0	22	12	0	22	0	0
Other	0	7	0	7	20	0	0	6	0	11	6	0

IBM 3033	IBM 4331	IBM 4341	ICL System 10	ICL 1900 & 2900 Series	Magnuson M-80/3	NASCO (fka) AS/3 & AS/3-5	NASCO (fka) AS/5 & AS/5-3	NASCO (fka) AS/5-703	NASCO AS/6	NCR Century 101 thru 200	NCR Century 201 thru 300	Manufacturer and Model / Survey Item
86	43	67	57	80	33	67	47	50	78	49	67	Significant Advantages (%) Users happy with response time
37	30	67	57	0	67	67	53	25	22	51	67	System easy to expand/reconfigure
3	4	0	7	0	33	11	6	25	0	2	6	System costs less than expected
52	56	33	14	40	100	89	6	100	89	45	42	Programs/data compatible, as vendor promised
57	43	33	0	0	67	78	74	75	89	15	33	Terminals/peripherals compatible, as vendor promised
15	56	33	14	20	100	67	53	75	44	11	0	System is power/energy efficient
20	35	33	7	20	33	33	0	0	0	4	0	Productivity aids help us keep programming costs down
22	11	0	7	0	0	22	0	0	0	2	6	Database language effective
23	28	0	14	0	33	67	33	75	44	11	0	Delivery and/or installation of equipment was ahead of schedule
5	13	0	0	0	0	22	0	0	0	2	0	Delivery and/or installation of software was ahead of schedule
2	2	33	7	20	0	0	0	0	0	2	0	Other
30	29	30	26	28	37	31	28	33	27	24	19	Technical support: Trouble-shooting
29	28	33	26	20	37	28	30	25	27	27	23	Education
29	26	27	24	20	37	29	29	25	24	25	27	Documentation
30	31	30	24	30	35	30	32	37	30	29	28	Ease of programming
31	33	35	20	23	35	35	33	25	32	30	28	Ease of conversion
32	31	30	27	24	35	33	29	25	30	29	26	Overall satisfaction

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. . . In a Variety of Categories

Survey Item / Manufacturer and Model	IBM 370/115	IBM 370/125	IBM 370/135	IBM 370/138	IBM 370/145	IBM 370/148	IBM 370/155	IBM 370/158	IBM 370/165	IBM 370/168	IBM 3031	IBM 3032
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Users Rate Their Mainframes

Survey Item / Manufacturer and Model	NCR 9400 Series	NCR 8500 Series	NCR (other models)	Unisys 90/30	Unisys 90/60 & 90/70	Unisys 90/80	Univac 1108, 1108, 1110	Univac 1100/10/11/12	Univac 1100/20/43	Unisys 1100/60/61/62	Univac (other models)	Mainframes (other models)
[illegible]	[illegible]	[illegible]	21.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	73.7	14.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Principal Applications (%)												
Accounting	76	64	50	92	75	63	55	69	71	62	63	50
Construction	0	3	0	3	13	0	9	0	0	0	0	0
Education	2	0	0	7	25	13	9	0	14	31	18	0
Government	11	6	13	18	25	25	55	14	14	23	18	0
Manufacturing	18	21	0	47	25	38	27	15	14	38	0	0
Payroll/Personnel	56	64	13	68	50	63	46	62	87	54	73	28
Service Bureaus	13	10	0	12	13	13	9	0	0	15	18	0
Transportation	4	6	0	7	13	0	18	15	14	18	18	0
Word Processing	2	0	0	3	0	0	27	0	0	8	0	0
Banking/Finance	13	28	50	3	0	0	0	15	14	0	18	0
Distributed Processing	9	6	25	5	13	25	18	8	0	15	0	0
Engineering/Scientific	2	0	0	5	25	25	27	38	0	38	0	25
Insurance	4	3	0	7	0	0	18	0	0	0	0	28
Medical/Health Care	4	15	0	5	0	0	9	0	0	15	0	0
Retail	9	23	50	17	0	13	0	0	0	0	18	0
Transaction Processing	7	18	50	2	0	13	27	38	71	31	0	0
Utilities-Power	13	3	13	0	13	29	9	8	0	0	8	0
Other	29	10	25	0	25	13	9	15	14	0	9	50
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hardware Configuration												
No. of CPUs	46	44	10	80	8	10	18	18	14	54	14	4
No. of Workstations (avg.)	8.2	22.9	7.5	7.0	9.6	62.0	20.4	33.6	124.4	66.0	81.8	301.7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	27	41	38	27	13	13	36	38	43	46	25	0
Proprietary Software	24	49	0	27	38	13	45	46	14	31	15	0
Expanded Datacomm	40	64	75	63	75	38	45	58	71	46	15	25
Distributed Processing	2	13	13	22	13	25	25	23	29	23	0	0
Integrated Word Processing	9	10	13	10	0	13	25	5	0	23	0	0
Other	11	6	0	2	0	0	13	8	0	0	8	0

Survey Item / Manufacturer and Model	NCR 9400 Series	NCR 8500 Series	NCR (other models)	Unisys 90/30	Unisys 90/60 & 90/70	Unisys 90/80	Univac 1108, 1108, 1110	Univac 1100/10/11/12	Univac 1100/20/43	Unisys 1100/60/61/62	Univac (other models)	Mainframes (other models)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Significant Advantages (%)												
Users happy with response time	51	28	50	46	63	88	55	85	57	54	27	0
System easy to expand/reconfigure	64	72	63	65	50	50	55	54	57	54	36	0
System costs less than expected	11	13	38	2	0	13	0	0	0	15	18	0
Programs/data compatible, as vendor promised	71	64	38	38	38	25	27	46	0	38	54	25
Terminals/peripherals compatible, as vendor promised	44	41	25	5	13	88	9	38	57	38	0	25
System is power/energy efficient	20	18	50	14	13	25	9	15	14	46	0	0
Productivity aids help us keep programming costs down	22	23	25	20	50	13	27	54	0	31	27	0
Database language effective	16	13	25	12	13	25	18	46	43	23	0	50
Delivery and/or installation of equipment was ahead of schedule	16	16	13	15	25	13	18	9	43	23	9	0
Delivery and/or installation of software was ahead of schedule	4	10	13	5	25	0	18	9	0	15	0	0
Other	2	0	13	3	0	0	18	0	0	0	9	25
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Technical support:												
Trouble-shooting	2.7	2.3	2.9	2.4	2.8	3.3	2.6	2.7	3.0	2.5	2.7	2.5
Education	2.8	2.7	2.6	2.4	2.9	2.5	2.5	2.8	2.8	2.6	2.3	2.3
Documentation	2.6	2.3	2.3	2.3	2.4	2.4	2.2	2.6	2.7	2.5	2.3	1.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ease of programming	3.3	3.0	3.2	3.1	2.9	3.1	3.0	3.3	2.6	2.8	3.1	3.5
Ease of conversion	3.3	3.2	3.4	3.0	2.9	3.1	2.8	2.9	2.2	2.6	3.0	2.8
Overall satisfaction	3.2	3.2	3.1	2.8	3.1	3.3	3.1	3.3	2.7	3.0	3.4	3.3

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Shortage of Programmers Found Growing More Acute

By Robert L. Glass
Special to CW

COMMERCE, Texas — Severe shortages of programming personnel are not only upon us, they are also growing more intense.

That was the word from Dr. John W. Hamblen of the University of Missouri at Rolla, speaking at the Computer Users Conference at East Texas State University here recently.

Hamblen, who has for several years conducted an annual study of the ratio of computer science students to industrial needs, cited figures for this year:

- While 9,500 graduates with computer science bachelor's degrees were produced, 55,000 were needed;
- While 3,000 graduates with computer science master's degrees were produced, 34,000 were needed.

Similar shortfalls were noted in the doctoral programs. In fact, the shortage of Ph.D's available to teach in the academic world guarantees that the problem will continue because not enough professors are available to produce the needed students, Hamblen said.

Computer science graduates with bachelor's degrees are earning $19,000 to $21,000 in industry, and those with master's degrees make an additional $4,000. At those prices, the academic world simply cannot offer enough to compete, he said.

By contrast, the production of graduates with associate's (two-year) degrees approximately matches the current need. Hamblen expects this situation to change as industry clambers lower down the educational ladder to satisfy its needs.

The software skills shortfall is a national crisis, he added.

Benefit Planners Set DP Institute

LAS VEGAS — The International Foundation of Employee Benefit Plans will hold its 1980 Institute Oct. 13-15 at the Las Vegas Hilton.

The conference will target trustees of employee benefit plans salaried and contract administrators and administrative office personnel with electronic DP responsibilities.

Session topics include on-line claims administration, storage and retrieval of pension-fund data, security and controls, getting started in computers, word processing and systems design.

The conference cost $300 for foundation members and $375 for nonmembers. More information is available from the foundation at P.O. Box 69, Brookfield, Wis. 53005.

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Features 'Executive Services'

Four-Phase Office System Unites DP, WP, Net

By Jeffry Beeler
CW West Coast Bureau

CUPERTINO, Calif. — DP, word processing (WP) and network communications are all said to be integrated in a multiterminal office automation system that Four-Phase Systems, Inc. is aiming primarily at major insurance companies, financial institutions and members of the Fortune 1,000 club.

As part of its integrated DP and WP package, the Office Management System /IV (OMS/IV) provides a family of "executive services" features that top corporate managers can use to maintain "tickler" files, keep track of their daily schedules, store phone messages and retrieve both customers' and employees' phone numbers, a Four-Phase spokesman said.

In essence, the executive services are paperless replacements for familiar office items like "reminder" notes, appointment calendars, handwritten phone messages and employee/-customer directories.

OMS/IV also offers an "electronic document distribution" capability, which serves roughly the same purpose as an electronic mail system, the spokesman said.

Key to Operation

The key to OMS/IV's operation lies squarely in its software, which places DP, word processing and network communications under the supervision of a single Four-Phase control program called the MultiFunction Executive (MFE). The MFE-controlled software, which Four-Phase has never offered before, has been combined with the firm's existing hardware to produce a system that allows DP, word processing and network communications to be performed from the same terminal, the source said.

As part of its networking capability, OMS/IV reportedly supports both batch and on-line communications. In interactive mode, the system uses the IBM 3270 bisynchronous or Synchronous Data Link control protocols. In batch mode, it supports line protocols like IBM 2780, 3780, Hasp and 2770.

The system's networking capabilities underlie its electronic document distribution feature. With the feature, any workstation in an OMS/IV network can automatically send documents to or receive them from any other node in the same network, the spokesman said.

Terminals in an OMS/IV system can be placed either within the same building or across the country from one another. In either case, all transmissions between workstations are entirely electronic; no hard copy is ever involved.

Executive Services

Among some of its other main features, OMS/IV provides a total of six executive services features, including:

- Executive scheduling, which provides both daily and half-hourly breakdowns of an appointment schedule and allows managers to arrange conferences for up to 16 participants.
- A tickler service, which reminds users of the important events on today's and tomorrow's agendas.
- An employee directory, which makes key employee information like work location, telephone number and security status available to executives, switchboard operators and administrative staff members.
- An office directory, which lists customer names, addresses and phone numbers.
- An integrated calculator, which performs the four basic arithmetic functions while providing a digital readout and hard-copy output.
- A telephone message capturing system, which allows users to list and instantly recall their phone messages.

Two Packages

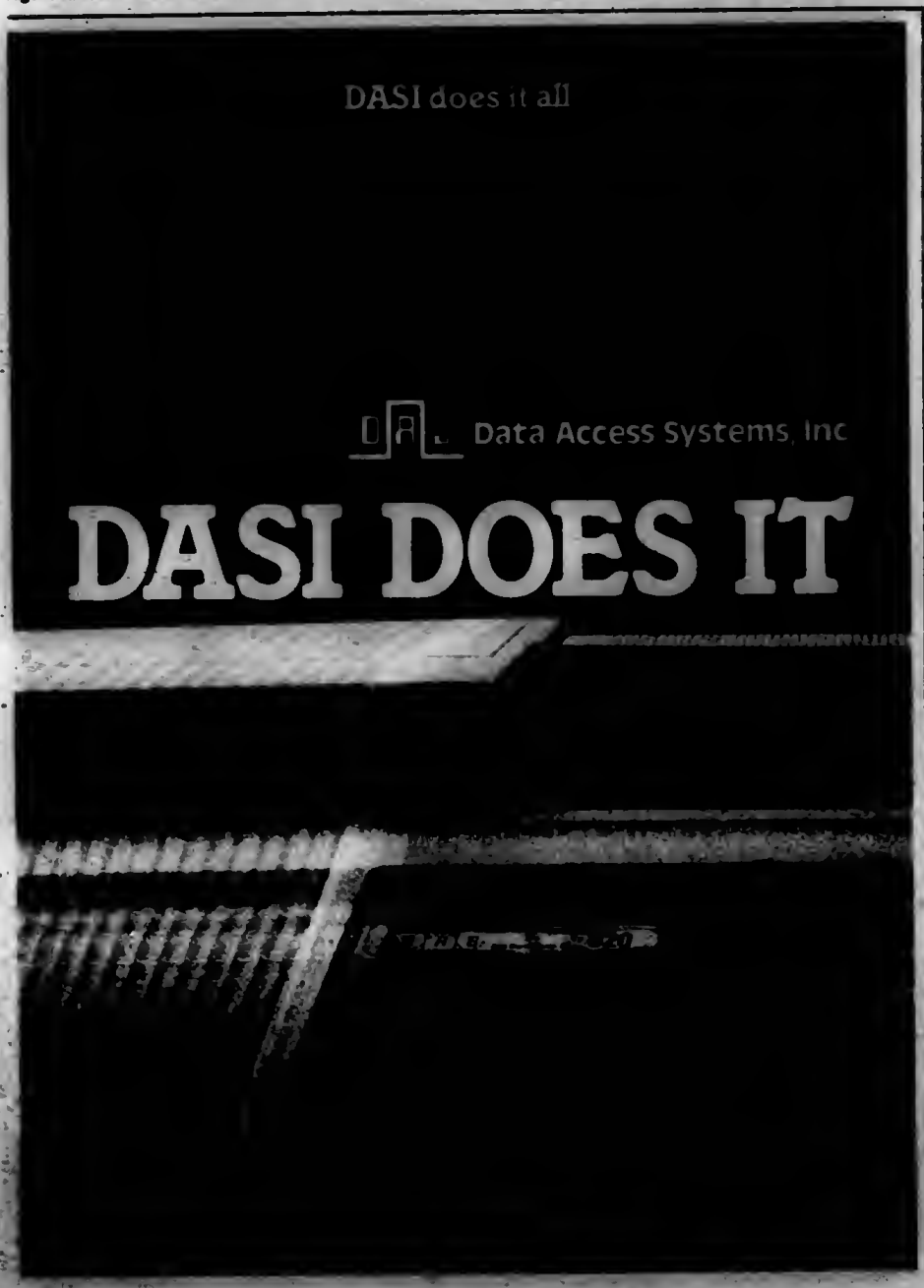
On the software side, OMS/IV is built primarily around two packages: Vision/Data IV, a transaction-oriented distributed processing system, and Foreword, a shared-logic word processing system.

Vision/Data IV combines source data entry with local-file management and allows workstations to perform many of the same functions as host mainframes, while Foreword permits users to produce, store and retrieve letters, reports, manuals and other documents, Four-Phase said.

On the hardware side, meanwhile, OMS/IV can be built around a choice of three Four-Phase processors: the IV/60, IV/65 and IV/90 Model 2, which range in main memory from 192K bytes to 480K bytes. The three CPU models support up to eight, 24 and 32 workstations, respectively.

A mid-range system incorporating a 192K-byte IV/65 with two 20 char./-sec printers, 16 workstations and a 22.5M-byte disk unit leases for $2,997/mo under a one-year contract. A high-end system incorporating a 480K-byte IV/90 with four 20 char./-sec printers, a 120 line/min printer, 24 workstations and a 67.5M-byte disk unit leases for $5,201/mo under a one-year contract.

Shipments of OMS/IV, which is available through purchase as well as lease, will begin during the third quarter from Four-Phase at 10700 N. DeAnza Blvd., Cupertino, Calif. 95014.



Remote Links Help Process Influx of Cuban Refugees

By Bruce Heard
CW Staff

MIAMI — Several U.S. governmental agencies have enlisted the aid of a computer system with remote terminals to help process the stream of Cubans flowing into the U.S. and to find their families.

At press time Datacom Systems, Inc., a Miami-based time-sharing service bureau, had terminals installed and operating in Miami and Key West, Fla. Plans were under way to set up similar systems at Eglin Air Force Base near Pensacola, Fla. and Ft. Chaffee in Fort Smith, Ark., two additional processing points.

In Key West — which has felt the brunt of the Cuban influx — the service bureau has set up Applied Digital Data Systems, Inc. Regent 25 terminals and Texas Instruments, Inc. TI 820 printers.

At Key West, the names and alien numbers of arriving refugees are recorded by Immigration and Naturalization Service officials. The identifying numbers are then sent to Miami over dial-up lines to a Microdata Corp. Reality CPU with 128K bytes of main memory and two IBM 360/50s with 512K bytes of main memory.

That information is accessible from the other remote locations and is updated when refugees are moved to new locations.

Similar to the Key West terminal setup is one located at an old airport in Opa Locka, Fla., where yet more refugees are being processed.

Refugee Hot Line

Another terminal operation in Miami is being run in conjunction with a hot line by the Latin Chamber of Commerce. By dialing (800) 432-1074 from anywhere in the nation, interested parties can have access to the latest information on refugees.

Unlike the Key West and Opa Locka sites, the hot line terminals can retrieve data, but not update it. More than 1,000 calls daily have been flooding into the hot line, according to Datacom Systems' Frank Diaz, who added that Immigration is not the only federal agency using his company's system.

"The Department of Health, Education and Welfare (HEW) and the Labor Department are also using it," he said.

HEW is gathering occupational and educational data for use in future attempts to locate jobs and schools, while the Department of Labor is also interested in occupational information.

Statistical categories being compiled by the various agencies include age, sex, occupation and location of family members already in the U.S., Diaz said.

Master Index System

In Washington, D.C., at the Justice Department's Data Management Service center — where Immigration and Naturalization shares DP facilities with the Department of Justice — processing is also going on at a fever pitch, according to Director of ADP Systems Robert Robinson.

"The refugee problem is causing an additional work load, but we're not setting up any special new systems to work with it," he said.

Robinson's department is chiefly responsible for updating and maintaining a master index system of aliens, a system which is composed of data input when an alien first reports to any of the Immigration and Naturalization Service's nationwide district offices.

In the case of Cubans reporting to the Miami district office, the information is keyed into a Four-Phase System, Inc. Model 50 terminal and sent over dial-up lines to one of the two 12M-byte Amdahl Corp. 470V/7s at the Justice Data Management Service Center, Robinson said.

"Right now, we're just trying to keep the system up and running 22 hours a day, seven days a week," he added.

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Planes Fly Too Close During O'Hare Outages

By Marguerite Zientara
CW Staff

CHICAGO – Two passenger jets approaching O'Hare International Airport flew too close together recently when software bugs in the air traffic control (ATC) computer caused the system to go up and down repeatedly.

While the American Airlines and Britt Air jets were not on a collision course and were the normal 1,000 feet apart vertically, they came within an estimated 1.5 miles horizontally, half the standard three mile separation imposed on approaching aircraft, according to Matthew Dunne, president of the O'Hare chapter of the Professional Air Traffic Controllers Organization (Patco).

Federal Aviation Administration (FAA) and airport officials generally agreed the incident posed no serious threat to passenger safety, but controllers claimed the situation was "dangerous," caused controller confusion and underscores the need for a backup computer system at O'Hare.

Clock Stopped

At around 2:45 p.m. on May 6, "the digital clock that runs the computer stopped," Dunne recalled. "So no additional information was coming into the computer and no information could be relayed to the Air Route Traffic Control Center's computer [in nearby Aurora, Ill.]."

While controllers' radarscopes still displayed radar blips indicating aircraft locations, other functions dependent on the computer were lost, Dunne noted. "We couldn't hand-off [aircraft] to the center or accept hand-offs, and it was the peak traffic time of the day."

As the computer steadily "lost more and more functions," Dunne said, DP personnel planned a six-second "coordinated scatter" in which all data was flushed out and brought back up.

Unfortunately, "only about a quarter of the information returned and then everything went out again," Dunne recalled. A second planned scatter resulted in a "boom, boom, up, down, up, down, up, down" situation with alphanumeric data appearing and disappearing.

Controllers finally turned off their computer display data and worked only with radar tracking information, Dunne said. "The systems error occurred during one of the periods when the computer was malfunctioning," he noted.

O'Hare Data Systems Officer Warren Webber maintained, however, that the system went down only twice, "purposely," and that the incident occurred between the two controlled scatters, when the computer was functioning normally.

Wherever the incident – still under investigation by the FAA – actually occurred, "We're not complaining about the systems error," Dunne said. "What we're complaining about is the computer system itself.

"It doesn't fail every day, but it's behind the power curve," Dunne contended. "When we have our peak periods of traffic, the computer just does not operate sufficiently with that margin for safety we feel is necessary."

Once Too Much

Even the FAA, which in the past has maintained that O'Hare's ATC computer system is safe, adequate and reliable, said last week that "one [computer failure] is too often as far as we're concerned.

"We'd like to see the reliability improved; we're working on that now," the FAA spokesman at the Great Lakes Regional office said.

Although "brand new hardware" and an interim software package have been operational at O'Hare since April 7, according to Webber, the new system "relies on itself for backup, instead of an independent system to fall back on," Dunne said.

Such an independent backup system was among the demands by Patco representatives at O'Hare in a 1975 suit filed against the FAA, Civil Service Commission and the Department of Labor. The trial took place in January 1978 and the judge is "still deliberating," Dunne reported.

As for the new Univac 3A hardware – similar to and a modification of the old system, according to Webber – it has 144K of memory compared with the former 80K size. It also has "fail-soft" memory made possible by three backup memory modules, he said.

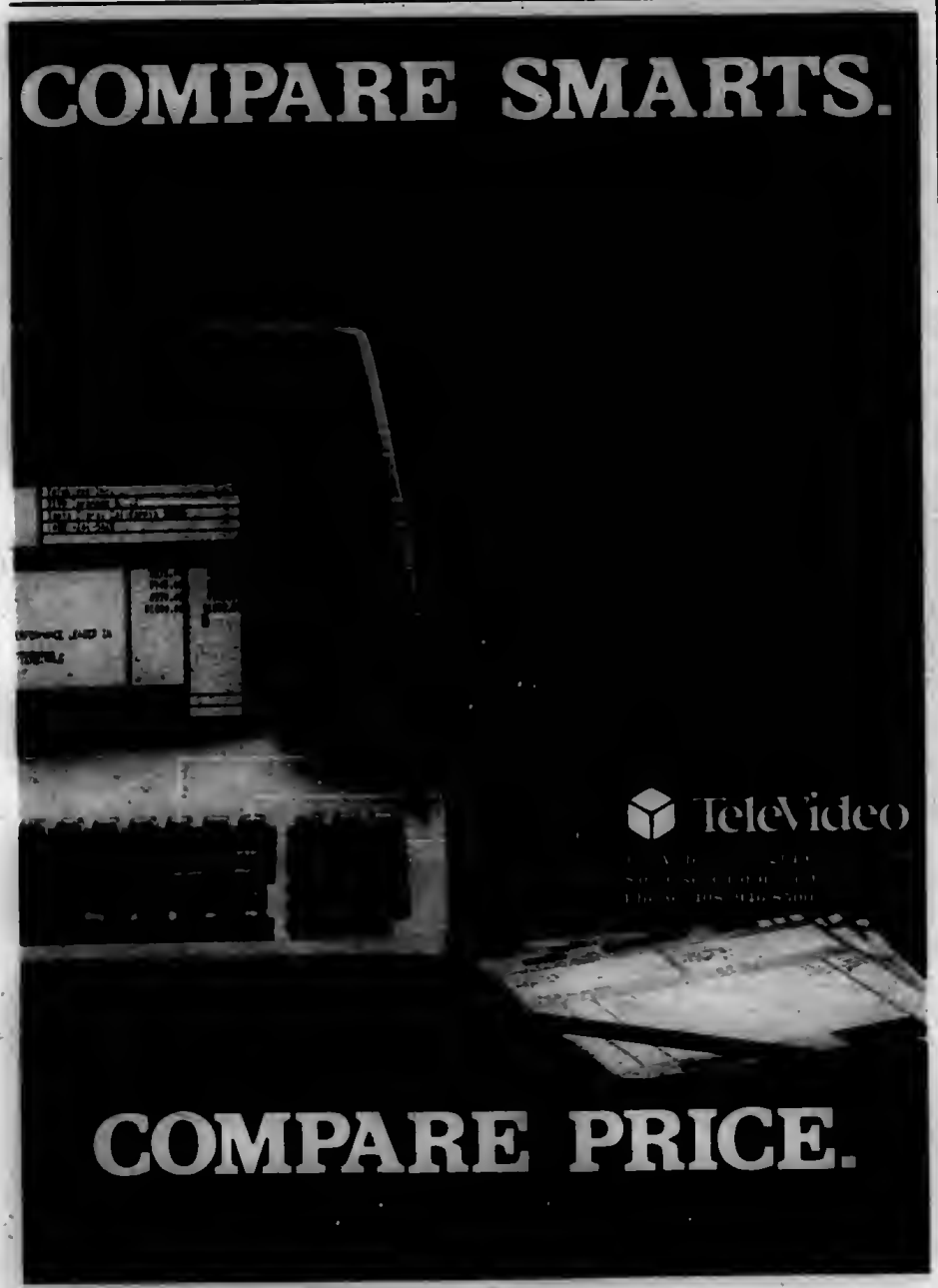
And while additional memory theoretically should solve many of O'Hare's memory overload problems, a "design problem" in the new multiprocessor system has exacerbated those very difficulties, Webber said.

Processors Overloaded

"The designers put too much of a work load on one [of the three] processors; they should have spread them around a little more," Webber said. It was the overloading of one processor that caused the "timing problems in flight data transfer" that resulted in the difficulties of May 6, Webber explained. The overloaded processor's functions included "keyboard operational functions, the flight data interfacility transfer and flight plans."

And while O'Hare DP personnel are still working on the software problems, "We had the old system there as a backup for a week after installation."

"We couldn't find anything wrong then; it ran fine," he recalled. "We would never have accepted the new system if we thought it wouldn't be reliable."



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Honeywell DPS-320 Beats IBM 4331 in Benchmarks

By Tom Henkel
CW Staff

The Level 64/DPS-320 processor from Honeywell, Inc. edged out IBM's 4331 in recent benchmark tests made for a prospective customer.

In addition, the minimum software required to operate the two systems costs $20,400 less on the Honeywell system, according to the customer, which asked to remain anonymous. The customer bought the Honeywell system.

Before deciding to upgrade from an IBM 360/25, the user ran a Cobol Release 26.1 Level D job on the 360 in one hour 45 minutes. The job was then submitted to the Honeywell and IBM 4331 processors for execution under two separate situations:

- Run through Cobol emulators, the job executed in 12 minutes on the Honeywell processor with the Gcos operating system and in 26 minutes on the IBM 4331.
- Run under the native versions of the two machines' operating systems, the job executed in 8.5 minutes on the Level 64 under Gcos and nine minutes on the 4331 under DOS/-VSE.

Each vendor was unaware that the tests were run on another machine.

Test Configurations

The tests were run on a Honeywell Level 64 with 768K bytes of main memory, three Honeywell 402 disk drives and Honeywell 210 and 211 tape drives.

Although the customer did not see the IBM system on which the tests were run, IBM said the machine was equivalent to a 1M-byte 4331 with three 3310 disk drives and two 3410 tape drives. Both systems operated in batch mode.

Although the 4331 nudged the Level/64 in the test run under native operating systems, the customer said Honeywell promised a 20% to 40% improvement in execution time if the customer were to undergo a training session on how to use Honeywell Ufas files as opposed to IBM's Isam.

The Clincher

Although hardware costs for the two systems were almost identical, the $20,400 difference in software costs was the real clincher for the customer. "We looked at what the costs were going to be in two years . . . Our costs were going to be even higher than that as we went on with IBM [because] we're looking at a complete network," the customer's DP manager noted.

"We've been [running] the Level 64 about three months doing conversions. For somebody coming off an IBM 360, the conversion is the easiest thing I've been through in my life."

Can't Justify 4331

But, the manager added, "there is nothing wrong with 4331. It's just a little more expensive than I can afford — I can't justify it to my manager.

"IBM is the best, and you're going to pay for the best. If I had unlimited funds, I might have been able to get my company to go [with the 4331].

"However, personally I would not have gone that way. I'll take the best thing for the dollar. This is what I got."

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TRW-Fujitsu Joint Venture Eyeing Plug-Compatible Mart

By Marcia Blumenthal
CW Staff

CLEVELAND — Fujitsu, Ltd., the Japanese firm that supplies Amdahl Corp. with mainframe assemblies for its high-end processors, appears ready to enter the end-user IBM plug-compatible market in the U.S. through a joint venture with TRW, Inc.

Initially, however, TRW-Fujitsu Co. (TFC) — as the firm will be known — will confine its activities to distributing its point-of-sale retail terminals and controllers and its financial systems, including teller terminals, automatic teller machines and its V-630 small business system, a spokesman said.

Until now, Fujitsu has sold its DP products in the U.S. primarily on an OEM basis.

Mid-Range Series

At present the firm supplies Japanese end users with its M-F series of mid-range plug-compatible mainframes, which reportedly span IBM's System/38, 370/138 to 158 and Series 4300 offerings.

However, a Fujitsu spokesman emphasized these mainframe products would not be part of the product sold initially by TFC.

The four systems comprising the M-F series include the M130F, which corresponds to IBM's 370/158 and 4331 systems; the M140F, with 512K to 2M bytes of main memory, equivalent to the System/38 and 370/158; the M150F, with 1M to 4M bytes of main storage, said to correspond with the 370/158; and the M160F, with 1M to 6M bytes of main memory, corresponding to the 370/158 and 4341.

If and when the TFC begins sales of Fujitsu's plug-compatible processors here, it would sell only the mid-range processors because of its OEM agreement to supply high-end mainframe assemblies to Amdahl Corp.

Fujitsu is currently the largest single shareholder in Amdahl with 33.7% of the outstanding shares.

TRW also markets various terminal products and, for the time being, TFC will continue to market TRW's products.

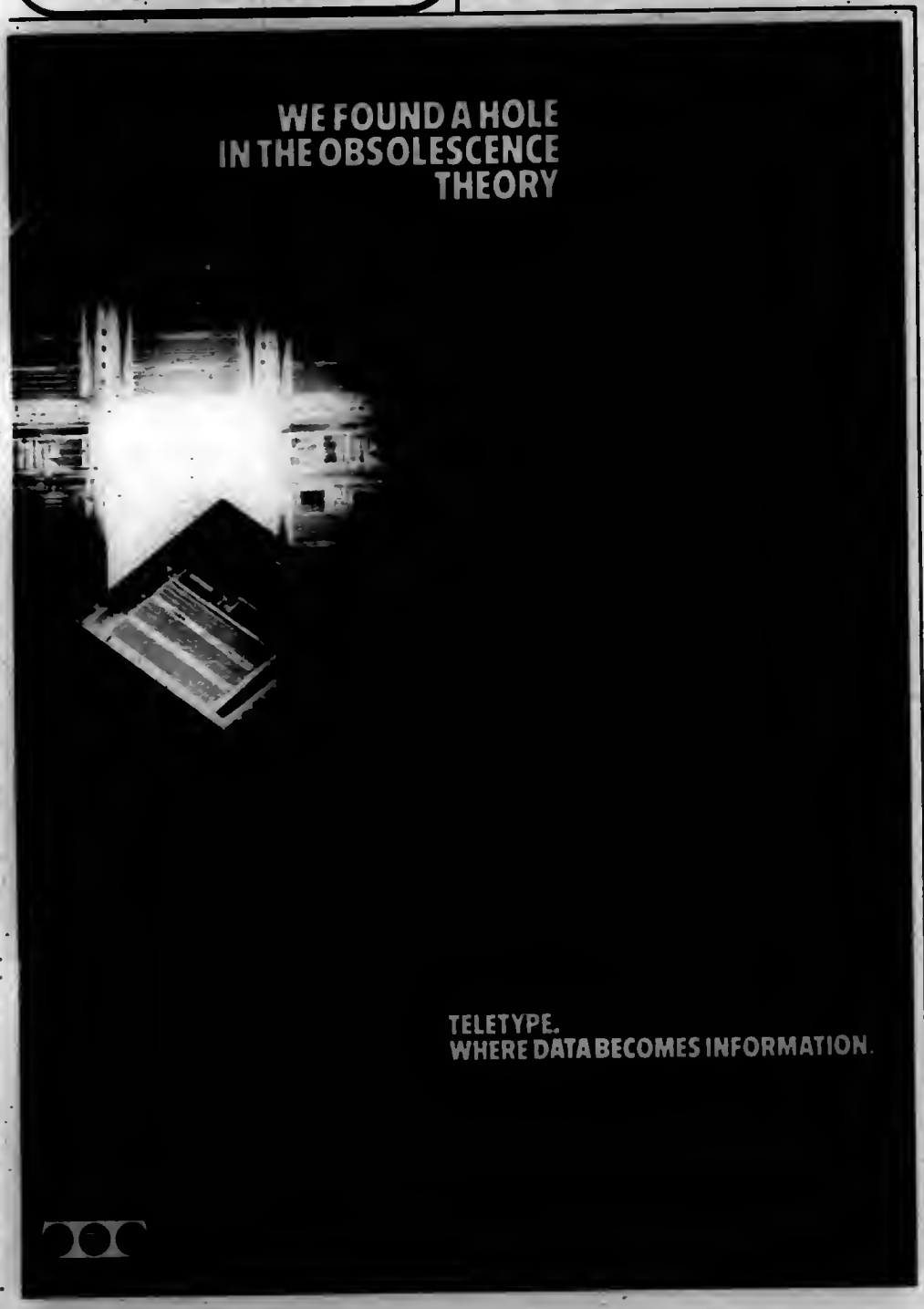
Employee Resources

The core of the new firm is about 450 employees, who until now comprised TRW's Communications Systems and Services Division. These employees, involved in marketing software development and support of TRW's terminal equipment, will be transferred to TFC.

In addition, TFC has contracted with TRW's Customer Service Division, which has 200 service centers and more than 3,000 employees, to provide service and maintenance of the products sold by TFC.

Heading TFC, which is 51% owned by Fujitsu, is TRW's vice-chairman, J.S. Webb. Commenting on the formation of the new firm, Webb said, "The fundamental objective of the company is the creation of a long-term relationship between TRW and Fujitsu which will allow the two companies to successfully participate in the expanding U.S. data processing market."

The financial force behind TFC, which plans to compete directly with IBM and several other DP suppliers, is formidable. Last year TRW had sales of $4.6 billion and Fujitsu had revenues of $2.1 billion, with about 70% generated from computer sales.



Sonny and Bill Show Goes Indoor

Signboard 'Tradition' at NCC Makes Last Stand

By Sonny Monosson
Special to CW

American Used Computer Corp. is going to have to move inside the National Computer Conference convention hall this year to stay out of jail! That's what Sonny and Bill had to put down in writing in Anaheim in 1978.

It got very critical that year. The alternatives were packing our bags and going home, staying there and being arrested or signing an agreement that at the end of 10 years of sidewalk stands, we would turn in our signs.

At that point, that didn't seem too bad. We were optimistic that perhaps things would change — that perhaps

Sonny Monosson hands out flyers on the Boardwalk in 1970.

the people with whom we signed the agreement would forget where they put it, or perhaps the times would change to enable us to continue our long tradition. Yes — it is one of the longest traditions associated with NCC.

But alas, it's over. This week, American occupies Booths 3316 and 3318.

It first started almost 11 years ago when we inadvertently bought a Digital Equipment Corp. PDP-10 minicomputer. At that time, only 250 PDP-10 machines had been made for fewer than 170 customers, and the economy was in a decline. I called all types of companies — got all types of leads — but to no avail. At one point, I was making 50 outgoing calls a day, but could find no one interested in that large piece of expensive hardware in our basement.

Voice of Experience

Finally, my partner Bill Grinker, a trained IBM man with 12 years in the business, said, "Why don't you go to NCC?" I said, "What is NCC?" He said, "The National Computer Conference — that's where all of the people go who want to look at the newest thing and want to buy hardware.

"Why don't you go with signboards on, like they do at restaurants?"

It was 1970.

The used computer business at that time was under $50 million annually, and 99.9% of the trading was done in IBM hardware. Trading in non-IBM hardware was virtually unknown, and perhaps that was why we could not sell this machine.

So — signboards. That's exactly what I did. The next day I had the most gorgeous signboards you ever saw. Soon my wife and I were bound for Atlantic City, N.J. — the sit of the conference that year.

But walking with signboards wasn't so easy. There was a stiff breeze along the Boardwalk, and the signs kept flipping over and twisting around. My wife finally suggested that I get some elastic garter material and put it along the sides to keep them in place. It worked.

Attention-Getter

As I walked along on the Boardwalk to the exhibition hall, peple looked at me and nudged each other, as if I were crazy.

We walked right up to the front of the exhibition hall — I registered and walked inside the hall wearing my signboards, and started looking at the various exhibits. I got very interested in what was being shown, and walked by the IBM exhibit, the DEC exhibit and the Honeywell, Inc. exhibit (those were the three names that were on my signboard).

As you can well imagine, each time I passed one of those exhibits, I created quite a commotion that sort of detracted from the exhibit. About a half-hour later, three police security guards came over to me and asked if I would leave the hall.

I asked why. They produced a gentlemen — representing the American Federation of Information Processing Societies (Afips) — who said that I didn't have a booth and I was advertising. I said to him, "So is everyone who is carrying a Datamation bag advertising, and you're not throwing all those people out.

"Someone must have complained to

(Continued on Page 26)

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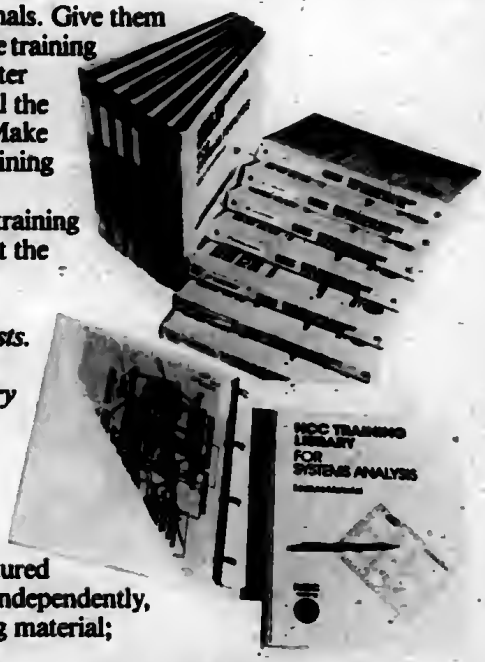

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Telephone Number _____ NCC CD(UBA) 5.1/80

'Oh Well, Abend.'

Signboard Moves Indoors And NCC 'Tradition' Ends

(Continued from Page 25)

you," I said, "and it must have been one of the three companies on my signboard." He said, "Yes, it was."

As it turned out, this gentleman was one of the ones that I had asked about putting his company's name on my sign. He said, "Sonny, I really didn't think you were going to do it."

"Well," I said, "here I am." He said "Well, you can't stay here, we are announcing a new product and you're advertising a product we are showing here, and I just can't let you stay inside and I'm registering a complaint."

At that point, I started being nudged by my wife, who always has the better sense of what to do, and she said, "Sonny, let's go outside." So I went outside and there I was in front on the exhibition hall.

I was downcast — I was depressed — and I figured I had wasted my time, money and energy coming to NCC.

'People I didn't know used to stop me and say, "How are you this year?" We sort of became a symbol, and this continued on for seven years.'

What happened is I was standing right in front of doors leading into the exhibition hall, and everyone who went in had to go by me. People started poking each other, looking at me. My wife was carrying my flyers, and before I knew it she was handing them out. People came over and were speaking to me, and I was picking up their business cards. Here I was, back in business.

No booths outside the exhibition hall — no competition from other vendors — no distracting sights and sounds — plus the ability to converse freely with people. This was fine.

The uniqueness of the signboard routine was picked up by the trade press. Very shortly we had pictures in many publications, both in this country and worldwide. Subsequently, we sold our DEC PDP-10.

NCC Tradition

The years passed and we visited many cities. We were always cordially greeted — if not immediately, by the end of the next hour — for we had become a tradition at the NCC.

People I didn't know used to stop me and say, "How are you this year?" We sort of became a symbol, and this continued on for seven years.

At the end or our eighth year, NCC was in New York. We tried a novel approach this time — we glued more than 200 dollars bills on our signboards intimating that we had money to buy computer equipment.

We had to stay close enough to each other to watch one another's money. In fact, we only had only one loss we could report, and that was from one of our closest friends who said he was hungry. He pulled off a couple of our dollar bills and bought a sandwich.

Too Much

It was Anaheim where we came in our ninth year expecting the same hospitality and friendliness that we had always received. This time, though, when we were stopped by the police, we were told we had to move.

Naturally, we refered the police to Afips and to Jerry Chiffriller who, after all, had given us permission all these years. We couldn't conceive of him changing his mind without advising us.

All this talk didn't help, and soon we were in Jerry Chiffriller's office with the police. It appears that exhibitors inside were beginning to complain. Whatever pressures were on Jerry Chiffriller, they were enough that year so that no matter what we did, we couldn't change his mind.

Yes, we sold a tradition to stay out of jail. Sad to say, the fun's over.

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Job Switch Seen No Cure for Feeling Stymied

By Connie Winkler
CW Staff

NEW YORK — Even in today's sellers' job market, switching DP jobs may not overcome the feeling of being stifled on a job.

That was the view of seven DP leaders and personnel experts who discussed career-path quandaries at a recent panel sponsored by the Association for Women in Computing here.

Switching jobs for an extra $2,000 a year is not worth it, according to Susan Werbin, who moved from a DP job to her own recruiting firm. "If you can stay someplace and learn and grow, stay.

"At your company you've created a network in a way that made you more effective. If you go someplace else you have to start building another network," she added.

The feeling of being stifled may be based on a narrow perception, Michele Borofsky of the recruitment firm of Weiss-Deimig said. "Know what other professionals in your field are doing and their salaries," she urged. DPers often work in a vacuum and do not have a frame of reference for how well they are doing.

"Don't believe that sort of persecution complex," Diana Dragan said about the stymied feeling. She is a personnel specialist with Mobil Oil Corp.

"Talk to your boss — exhaust all the possibilities," Dragan urged. "Figure out your own strategy for getting in touch with people influential in the company. They are not going to come to you; you have to go to them."

No Sympathy

Another human resources specialist, Tom Tepe from J.C. Penney Co., Inc., said he has no sympathy for women who complained they had been stymied in their previous jobs by male chauvinist pigs.

"Understand how you are perceived [within the company] and whether it is legitimate," Tepe said. "Some changes might be dictated by your behavior."

Eleanor M. Bird, manager of technical systems at Royal Insurance Companies, recommended two simple words to get "unstuck" from a job. "Assume responsibility," she said. "If you see something you can do, do it. It will be noticed."

If you perform like a "dummy" in one situation, do not sit back and stop trying. "The person who concluded you are a dummy then has that substantiated," according to Joseph Pocchia, vice-president of the information systems group at Chemical Bank. "Show them they are wrong."

Pocchia also said he has found his experience in difficult environments the best training in the long run. To keep the career moving, he urged becoming familiar with all areas of DP instead of moving to the top in one function and then expecting to leap to general management.

Work for a profitable company, Pocchia added. "If a company isn't profitable and growing, there's very little opportunity."

Judith S. Abreu suggested volunteering time to get involved in and learn about other areas and then formulating a career plan. "If you don't have a plan, it's difficult to determine whether you're ready for the next step," the director of systems assurance at CBS, Inc. said.

Greater Selectivity

Even if the DPer decides on a job switch, the situation today is not what it was a year ago. "Companies are tending to be a little more selective," Werbin said. "There isn't the same tone of desperation as a year ago."

Whereas a company a year ago might have hired a junior programmer with one year of Cobol experience and then trained him, this year the same company would hire an experienced programmer, Borofsky said. Too often the

(Continued on Page 29)

CW Photo by C. Winkler

From left, Diana Dragan, Tom Tepe, Judy Abreu, Joseph Pocchia and Eleanor Bird discuss job quandaries.

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'Nobody's Feeding the Ranks'

Panel Decries Lack of Training for Managers

By Bruce Heard
CW Staff

WOBURN, Mass. — DP and data communications training programs are as scarce as the number of qualified people interested in taking them, a panel at the Expo 80 agreed when the traveling conference and exposition stopped here recently.

Larry Grodman, president of QED Information Sciences, Inc., QED Vice-President Ed Kerr and Jerry Ryan, Software Research Corp.'s educational director, all decried the lack of foresight on the part of DP and data communications managers, warning that they must change their ways or risk serious problems.

The rapid advances of technology mean managers have to train people more effectively or accept growing levels of incompetence, Grodman said.

"Most companies don't take a systematic view of their people's development or the skills needed for a good training program," he said. "It's not enough to take internal surveys or schedule a few courses."

Employers should bring in quality speakers and encourage open discussion among employees, he said, suggesting such discussion could be held between the hours of 4 p.m. and 6 p.m., when both employer and employee would be giving up time.

Grodman cited the Electronic Data Processing Educational Program (Edpep) as a notable contribution and said that program has spread from eight colleges to 65 corporations.

"Education should not be a hit-or-miss operation," he said. "And it should not be reactive, but direct."

Kerr prefaced his remarks by showing a transparency entitled "Where Have All the People Gone?" "The people problem is becoming severe," he said. "Where will they come from and how will we train them?"

More money is spent on people than hardware and yet industry managers lavish huge sums on hardware maintenance while people remain untrained, he claimed. Kerr called that condition "incomprehensible."

"Nobody's feeding the ranks," he added.

Those ranks are going to grow even thinner during the '80s because fewer people will be entering the job market. Those who do will be tempted by other industries, Kerr said.

Bright Spot

One bright spot is the growing popularity of personal computers, Kerr said. Users and their children will acquire from personal computers DP sophistication that would otherwise have to be taught on-the-job.

In order to encourage those people to join the DP and data communications industries, simpler computer languages should be developed, Kerr added.

Ryan called the current data communications environment "scary as blazes" and said new architecture and philosophies, packet networks and updated industry standards are leaving people befuddled.

"How do you use them?" he said of the changes. "There's no set of standards you can pick up and read in a book."

Like Grodman, he claimed industry managers have not taken the time to properly assess employee skills and needs. Educational programs must be built on an understanding of personnel problems, he maintained.

Ryan advocated the use of a career path counselor to help determine the job needs of individual employees and their most likely paths to success.

One method he recommended as a likely training tool is "tailored, mixed-resource programs" consisting of educational sources ranging from textbooks to on-the-job training, self-paced media and specialized tutoring.

User groups such as the National Association of Data Communication Users can also make valuable educational contributions in the form of seminars that address the specific needs of participants, he said.

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Reference Service Connects Potential, Current Users

BOULDER, Colo. — A reference service allowing potential hardware and software product buyers to discuss those products with current users has been announced by the Association of Computer Users (ACU) here.

When a DP supplier registers one or more of its products with ACU, it provides at least 10 names of current users per product. Those users have agreed to answer questions on the product.

In order to use the service, potential buyers contact ACU by mail or telephone and are then given the references, free of charge, which they may contact directly.

The base charge for vendor registration is $290 per calendar year. This figure reflects a fee of $25 for each user reference membership plus a $40 administrative fee, ACU said from 1690 38 St., P.O. Box 9003, Boulder, Colo. 80301.

ACU does not test or rate products, the association emphasized. Its function is to facilitate direct communication between current and potential users.

'Quarterly Bibliography' Gets New Name: 'Index'

PHOENIX — The *Quarterly Bibliography of Computers and Data Processing* has changed its name to the *Computer Literature Index*, its publisher, Applied Computer Research (ACR), has announced.

The index is published quarterly and provides both a subject and author index to current computer and DP literature. More than 120 periodicals are covered on a regular basis in addition to books and conference and government reports.

A yearly $75 subscription price covers four quarterly issues plus the annual *Cumulation*. The *Cumulation* combines the four quarterly issues into a single volume for permanent reference.

Sample copies are available from Applied Computer Research, P.O. Box 9280, Phoenix, Ariz. 85068.

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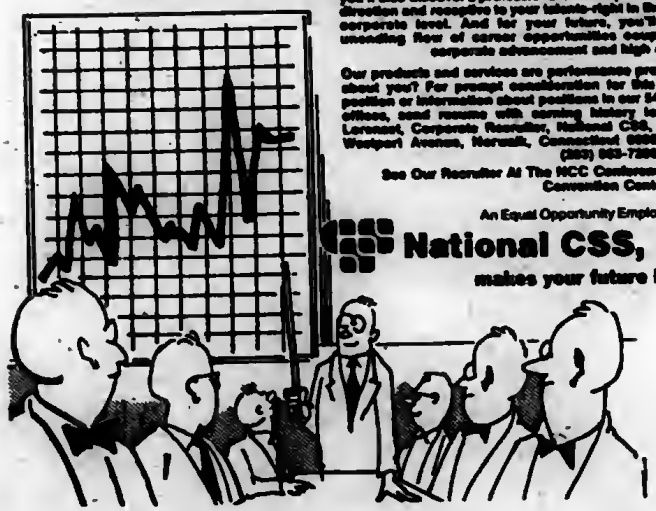

Merger of Bay State DP Agencies Under Study

By Jay Woodruff
CW Staff

BOSTON — Can the Commonwealth of Massachusetts save money by consolidating the DP centers now serving its Registry of Motor Vehicles and the Executive Office of Public Safety?

The answer is expected later this month when the consulting firm P.A. International, whose U.S. headquarters is in New York, delivers its third and final report on the proposal.

The report will either agree with the state's Management Task Force recommendation of late 1979 that the merger would be cost-effective, or demonstrate why it may not be financially worth the effort, according to George Tully, assistant secretary of the Executive Office of Public Safety.

To date P.A. International has delivered an inventory of all the functions performed at the two centers and estimated how much it will cost if the registry — which will use the Public Safety system if the merger takes place — continues to operate its Burroughs Corp. 3500 system.

For now, the registry's system continues to run applications such as processing operator permits and vehicle and title registrations. It also maintains an information bank for the state's Rating Board, which sets the automobile insurance rates for the commonwealth.

Criminal Justice

At the Office of Public Safety, the DP staff is implementing a Criminal Justice Information System (CJIS) on a large Burroughs 6750 multiprocessor system, which can operate in a somewhat degraded performance level if a CPU or communications processor breaks down, according to Lou Sakin, executive director of criminal systems history.

CJIS is a collective title for a pet of subsystems, or applications, under the area of criminal history and law enforcement in the state. It contains the data for use by law enforcement and criminal justice agencies; information on criminal histories; identification, correction and parole management systems; and probation applications.

If the merger takes place, all of the above application subsystems and more minor ones would continue to be run using the Burroughs system or "some variation of that system at the Office of Public Safety," Sakin explained.

Split Network

Under CJIS, the office also runs what was described as a network information system in two halves — local and interstate.

The local half connects police departments, both state police and municipalities, as well as the Department of Probation, Firearms Bureau and other agencies in the state who must have access to information in CJIS. Some of the network is still being implemented, Sakin said.

The second half, he said, connects Massachusetts to agencies such as the National Crime Information Center, run by the Federal Bureau of Investigation, which allows the state to access a variety of types of criminal information.

Interstate System

In addition, the state can access the National Law Enforcement Telecommunications System (Nlets), a message-switching system that allows state law enforcement agencies to communicate with each other. Nlets is used, for example, to track a criminal who is thought to have left the boundaries of one state and entered another.

The law enforcement system data base will be "separate and distinct" from the registry system data base. Further, telecommunications networks for the two offices will remain separate through the proposed merger, Sakin indicated.

A very sophisticated security system" is being established with differing levels of security based on the identification of the user and the user's department, he added.

Although the registry will share the services of the Burroughs multiprocessor if the merger takes place, it will remain responsible for, and in control of, the development and maintenance of its own applications, according to Sakin.

Job-Switching Not Advised

(Continued from Page 27)

junior programmer moved on to another job after a year.

"Companies are loosening up on money, but they expect someone walking in the door with talent," Borofsky said.

The corporate personnel specialists said they too are throwing away resumes for persons with less than two years' experience.

Job experience demands have switched in the past year from IMS experience to CICS communications experience, Werbin noted. Companies have also decided it is better to train someone on their staff in IMS than to bring in someone new, she added.

The switch from IMS to CICS is a reflection of IBM's introduction of the 4300 with CICS teleprocessing capability, Pocchia observed. He suggested: "Keep up technically to see where the hardware market is and job opportunities are."

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Until Job Surplus Ends

Consultant Sees DPer Unionization Unlikely

By Ann Dooley
CW Staff

DAYTON, Ohio — Do those rumblings of discontent in your DP shop foreshadow a drive for unionization? Will managers, in addition to coping with employee job-hopping, now have to worry about unionization, too?

Although DP managers are becoming increasingly concerned about the threat of unionization, there is little cause for alarm — so far, according to management consultant Louis V. Imundo, president of Management Perspectives here, a consulting firm specializing in organizational and human resource development training.

Even though DPers, like other white-collar employees, are quickly becoming the target of union groups seeking to bolster sagging memberships, it is unlikely that they will unionize in large numbers, the consultant said.

But DP employers are worried nonetheless, according to Imundo, who claims that 25% of his business stems from DP executives seeking to protect their companies from unionization. And that figure, which has mushroomed in recent years, is continuing to grow.

To date, the number of DP shops unionizing is very small since the demand for high-level DPers tends to dull the need for unions. Programmers and systems analysts can simply move on to another job if they do not like their present one, he noted.

In addition, the current recession will hit hard at unions growth since unions have no power to guarantee job security.

Best Defense

In general, the best defense against unions is good management, according to Imundo. Frequently, firms with technically oriented managers who treat employees like machines create their own problems.

However, if and when the surplus of jobs dries up, DPers may consider unionization as a more serious alternative, he added.

Poor pay — a traditional union incentive — is not a problem for most DPers, who can generally command their own salaries. Unfair treatment, bad management procedures or overwork are common complaints.

While Imundo does not condemn unions on a wholesale basis, he noted that they do decrease flexibility and diminish decision-making powers, although frequently they can force better management practices. But, he added, good management can be implemented without the necessity of a union.

Lower Strata

Imundo believes that unions will first target the lower level jobs such as computer operators or data entry, where jobs are more standardized and demand has caught up with supply. But if demand for higher level jobs tapers off, DPers may find it more difficult to jump around, he noted.

In Imundo's experience, the higher up the strata of DP jobs, the less talk there is of unionization. But Imundo sees dissatisfaction among DPers at all levels which could ultimately result in a concerted unionization drive.

According to Imundo, many DP installations get so bogged down with large amounts of work and tight deadlines that they turn into sweatshops.

Younger, highly educated technical employees are more apt to speak out than older employees and may also be more willing to consider varied approaches, such as unionization, according to Imundo.

Management Mix

In some cases, rapidly growing DP companies or installations will promote people beyond their capabilities; thus a good programmer is too often promoted into a bad manager, Imundo noted.

Very often, too, DPers are so technically oriented that they cannot deal with coworkers or management. And when a person like that becomes a manager, real problems develop, he stated.

The best practice is to promote a management mix so that the person in charge is neither totally technical nor totally managerial, he contended.

Commenting on the recent trend to recycle unemployed teachers into DP slots [CW, April 28], Imundo noted that these trainees are learning out of necessity,not personal motivation, and will therefore more than likely wind up as dissatisfied employees. And this only adds to the pool of already frustrated DP employees.

Outside stresses such as inflation are also causing dissatisfaction, which could make DPers more susceptible to union-organizing efforts, according to Imundo.

But if the surplus of jobs ever ends, unions may succeed in convincing DPers they can help them bargain from greater strength, Imundo noted. If DPers begin staying at one job for longer periods of time, they may begin changing the conditions where they are, instead of heading to where the grass looks greener. And then unions may really give DP managers something to worry about.

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Print Technology: Band

Print Speed:
B300: 300 LPM*
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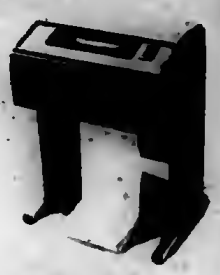

2230/2260

Print Technology: Drum

Print Speed:
2230: 300 LPM*
2260: 600 LPM*

Dimensions:
Height: 45.0 in.
Width: 33.0 in.
Depth: 26.0 in.
Weight: 2230: 340 lbs.
2260: 370 lbs.

STANDARD FEATURES:
- Character Spacing: 10 cpi
- *Character Set: 64
- Line Spacing: 6/8 lpi
- Print Column: 136
- Paper Slew:
  2230: 20 ips
  2260: 25 ips
- Forms Length Select Switch
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- External Exerciser
- Paper Motion Detector
- Paper Puller
- Custom Interface
- 96 Character Set
- Special Character Set

NBS Drafts Changes to Federal I/O Standards

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The National Bureau of Standards (NBS) is considering enhancing its set of federal I/O interface standards. Adopted last year amid considerable controversy, those standards have led to suits against the government by four major mainframe manufacturers.

Besides proposing refinements to the four existing I/O standards, NBS said it will soon release specifications for a new I/O standard for advanced high-performance disk drives, such as the IBM 3370.

"The changes we're considering are part of the normal, expected maintenance of these [existing] standards over their lifetime," said Thomas Pyke, director of the Center for Computer Systems Engineering, part of the NBS Institute for Computer Sciences and Technology.

No Change in Date

The new proposals will not affect the June 23 implementation date of the four existing standards, Pyke noted. Honeywell Information Systems, Inc., Burroughs Corp., Control Data Corp. and Sperry Corp. have asked a federal court to delay the implementation until their suits to overturn the standards have been settled.

The four companies claimed in suits filed here last fall that the standards, based on IBM architecture, will deprive them of significant shares of the federal DP market [CW, Oct. 22, 29]. The firms said it will cost them millions of dollars and several years work to comply with the standards' specifications.

Rebuffed by the U.S. district court here last January, the firms have taken their suits to the U.S. Court of Appeals for the District of Columbia [CW, Feb. 11]. No ruling is expected before the June 23 implementation date.

Amendments Standards

The four standards, mandatory for all federal medium- and large-scale systems, cover the I/O channel interface, channel-level power control interface, operational specifications for magnetic tape subsystems and operational specifications for rotating mass storage subsystems.

The bureau is proposing that the I/O channel interface standard be amended to permit use of an "offset interlock" to speed long-distance mainframe-peripheral communications; relax the timeout requirements to permit use of control units offering logging and recovery procedures; and to relax certain internal cabling specifications.

Also under consideration is an entirely new standard for "fixed block rotating mass storage subsystems." The addition is needed, NBS said, because new systems coming to market and "expected to be available from multiple suppliers in 1981" represent "a major departure" from those devices covered by the existing standards.

A preliminary draft for the proposal can be obtained from the Director, Institute for Computer Sciences and Technology, Attention: I/O Channel Interface Comments, National Bureau of Standards, Washington, D.C. 20234.

The bureau is also seeking comments on the proposed standard and the enhancements proposed for the existing standards. Comments should be sent to the above address by June 30.

Other Activity

In other NBS standards activity, the bureau is proposing a Federal Information Processing Standard to cover 4-track, quarter-inch, 1,600 bit/in. phase-encoded "parallel recorded magnetic tape cartridge for information exchange."

The proposal is based on a draft standard developed and accepted by the X3B5 technical committee of the American National Standards Institute.

A copy of the technical specifications is available from the Standards Administration Office, Institute for Computer Sciences and Technology, National Bureau of Standards, Washington, D.C. 20234.

Public comments on the proposal are due by June 30.

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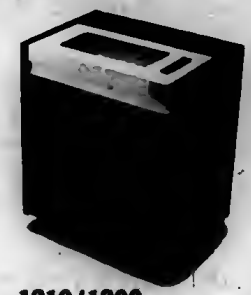
Height: 45.0 in.
Width: 33.0 in.
Depth: 26.0 in.
Weight: 420 lbs.

STANDARD FEATURES:
- Character Spacing: 10 cpi
- *Character Set: 64
- Line Spacing: 6/8 lpi
- Print Column: 136
- Paper Slew: 30 ips
- Forms Length Select Switch
- Universal Power Supply
- Paper Receptacle
- Static Eliminator
- Active Ribbon Deskew
- Self Test
- Quietized Cabinet
- Paper Motion Detector
- Paper Puller

OPTIONS:
- External Exerciser
- 96 Character Set
- Special Character Set
- Custom Interface



1210/1200

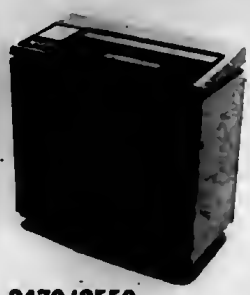
Print Technology: Chain Train

Print Speed:
1210: 1,000 LPM*
1200: 1,200 LPM*

Dimensions:
Height: 42.75 in.
Width: 36.5 in.
Depth: 26.0 in.
Weight: 570 lbs.

STANDARD FEATURES:
- Character Spacing: 10 cpi
- *Character Set: 64
- Line Spacing: 6/8 lpi
- Print Column: 132
- Paper Slew: 40 ips
- Forms Length Select Switch
- Universal Power Supply
- Diagnostic Display
- Adjustable Paper Receptacle
- Static Eliminator
- Self Test
- Tape Controlled 12 Ch VFU
- Quietized Cabinet
- Casters
- Paper Puller
- Vacuum System
- Paper Motion Detector

OPTIONS:
- Direct Access 12 Ch VFU
- Long Line Interface
- 96 Character Set
- Special Character Set
- Custom Interface



2470/2550

Print Technology:
2470 Drum
2550 Charaband

Print Speed:
2470: 1500 LPM*
2550: 1250 LPM*

Dimensions:
Height: 46 in.
Width: 48.5 in.
Depth: 24.5 in.
Weight: 800 lbs.

STANDARD FEATURES:
- Character Spacing: 10 cpi
- *Character Set: 64
- Line Spacing: 6/8 lpi
- Print Column: 132
- Paper Slew:
  2550: 60 lps
  2470: 35 lps
- Universal Power Supply
- Paper Receptacle
- Static Eliminator
- Self Test
- Tape Controlled 12 Ch VFU
- Active Ribbon Deskew
- Casters
- Quietized Cabinet
- Dual Print Speed
- Paper Motion Detector
- Elapsed Time Meter
- 96 Character (2nd set 2550 only)
- Penetration Phasing Control

OPTIONS:
- Direct Access 12 Ch VFU (2550 only)
- 96 Character Set Drum (2470 only)
- Long Line Interface.
- 136 Columns
- Custom Interface

Controllers & Interfaces

Digital Equipment
- PDP-8
- LSI-11, Q Bus
- PDP-11, UNIBUS
- DEC 20 Models 20, 40, 50 and 60

Hewlett Packard
- HP 1000
- HP 21MX
- HP 3000 Series II, III
- HP 3000 Series 30, 33
- HP 250/300

Data General
- Nova
  Program I/O
  Data Channel I/O
- Eclipse
  Program I/O
  Data Channel I/O

Interdata
- 7/Family
- 8/Family
- 16/Family
- 32/Family

IBM
- Series 1

Burroughs
- B80/700/800
- B1700/1800
- B2700/2800
- B3700/3800
- B4700/4800
- B6700/6800

Control Data
- Cyber Series

Data Communication Protocols (remote printers)
- RS 232-C Standard
- 20 MA Standard
- IBM 2780, 3780, 3270
- UNIVAC DCI 1000, 1004
- Honeywell VIP 7700
- Xerox SDS 7670
- Burroughs Poll & Select

Texas Instruments
- 990 DS Family

Qantel
- Model 950, 960, 970
- Model 1400, 1450

Wang
- VP, MVP and VS Systems

Other
- DP Series 4000 Replacement

Guide Describes Product Lines Of 91 Vendors

PENNSAUKEN, N.J. — Alltech Publishing Co. has released a guide detailing 91 suppliers of computers, printers, plotters, memory disks and other DP equipment.

"Report to Management on Computer Equipment Suppliers" covers more than 49 categories of computer equipment and is aimed at about 20 industry sectors, including manufacturing, banking, education and government.

The publication not only describes each supplier's line of wares, but also provides a small profile of each vendor and lists sources of maintenance for the supplier's equipment.

In addition, the report has a directory of supplier names, addresses and telephone numbers.

The publication costs $25, but the company will discount 15% if payment accompanies the order. Alltech is at 212 Cooper Center, N. Park Drive & Browning Road, Pennsauken, N.J. 08109.

For Consumer Protection, Privacy

FTC Sees Itself Regulating On-Line Shopping

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The on-line information services likely to be mass-marketed in the 1980s probably will have to be regulated by the Federal Trade Commission (FTC), according to a recent report written by the staff of the agency. This need will increase if present congressional and Federal Communications Commission (FCC) efforts to promote competition in the telecommunications industry are successful.

Entitled "Technology and Legal Change," the FTC report was prepared as a "briefing book" for members of the commission. It is basically intended to suggest possible areas for future FTC investigation.

"A major application of the new information technology involves on-line shopping services," the report says. "While these sales methods may be convenient for consumers and marketers alike, such forms of 'direct marketing' . . . may exacerbate the already existing problem of late or nondelivery of mail-order items."

There will "almost certainly be a blurring of the traditional distinctions between advertising and consumer information. For instance, a program segment on how to decrease gas consumption sponsored by an automobile manufacturer might appear as consumer information to the viewer, but in reality be extended advertisement for the company's products. Consumers could be deceived in such situations because they would not critically evaluate 'information' as they might an 'advertisement' "

The Privacy Issue

The FTC is also concerned about consumer privacy. The report pointed out that the new systems allow continuous surveys to be taken of consumer buying and viewing preferences, and this data can be integrated with demographic data collected on the viewer when he subscribes.

"The notion of a central computer compiling data on viewing habits, purchases and opinions for each user, is alarming to many. The improved demographic targeting of advertising that results from the use of such data may lead to advertisements which are tailored to specific consumer vulnerabilities. Such tailoring could result in less complete information or even material omissions of fact."

Social equity is another problem: "In general, the advantages of improving information services will be greatest for those consumers who can afford to pay for it. This development could result in an even greater gap between high-and low-income consumers."

Current trends within the telecommunications industry are likely to escalate these problems. As the report put it, "Technology is coming on-line at an accelerating rate, and the 1980s and 1990s may require a substantial change in the resources which the FTC directly devotes to consumer protection issues relating to the media."

Reason for Concern

A basic reason for FTC concern with the new information services is their dependence on advertising. Subscribers currently foot a substantial portion of the bill for cable TV services, but this dependence will grow markedly, the report predicted, as soon as cable systems are linked to 30% of all U.S. homes. Presently, they reach about 20% of the total.

One harbinger of what's coming is "Nielson and Arbitron are starting to provide audience size information for cable systems, the prerequisite [to] substantial sale of advertising space."

Meanwhile, both Congress and the FCC are intent on lifting much of the regulation now imposed on broadcasters. Even if these regulations are not erased, it is unclear if the new services will be adequately controlled, the report contended. A key problem, it said, is that present laws do not specify whether a cable TV operator is a common carrier or a broadcaster. In the former case, it is subject to much greater regulation.

One provision of pending legislation would erase the FCC's present power to cancel the license of a radio or TV station that allows false or deceptive advertising. If that provision is enacted, "an additional consumer protection burden may be cast on the FTC. To date, [the agency] has been able to rely on the broadcast media to responsibly prescreen advertising. It is not certain that reliance would continue to be well-placed in the event of extensive deregulation."

FTC regulation of noncable providers of on-line services may also be necessary, the report suggested. "The various legislative proposals under consideration would all allow AT&T to enter various markets from which it is currently barred . . . and also would allow other regulated carriers to provide a variety of competitive services."

While each pending bill "addresses the issue of the degree of separation necessary . . . to ensure that anticompetitive cross-subsidization does not take place when these carriers enter new markets," they "provide the FCC with no criteria for making such determinations."

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For more information, write Honeywell, 200 Smith Street (MS 487), Waltham, Massachusetts 02154.

Or better yet, see the DPS 8/20 making its debut at NCC. Check out its data base and transaction processing capabilities. Hands on.

Honeywell

Mobile Project by Pillsbury

System Feeds Consumers' Nutrition Knowledge

Pillsbury's traveling nutrition system has been educating people around the country about their eating habits. Participants punch in their daily menus, and the system responds with an analysis of their daily food intake.

By Jay Woodruff
CW Staff

MINNEAPOLIS — A computer has been touring the country to help make nutrition easier for consumers to understand.

The system, put together here by Pillsbury Co., has made appearances throughout Minnesota and many other states, surprising even smart eaters with some unexpected news about what their diets lack and steps they can take to correct them.

The minicomputer-based system was programmed to evaluate 133 foods. It was designed by Pillsbury at the request of the Minneapolis Library, which asked for a futuristic display on nutrition. Dr. Howard Bauman, vice-president for science and technology at Pillsbury, put the project together with the aid of computer specialists and nutritionists within the company.

Successful Start

The project's success led the company to put together a system for traveling demonstrations, then another to meet growing requests for this form of nutrition education, Bauman indicated.

The system is based on a Digital Equipment Corp. PDP-11/03 minicomputer which can be connected to up to three keyboards, a CRT and a printer. One of the systems includes a 24-in. Sony Corp. CRT for demonstrations requiring a large viewing screen. Both systems are completed on site with leased or rented terminals, as well as a printer and a CRT (when the large CRT is not required),according to Pillsbury research scientist William, Egar.

The PDP-11/03, using programs downloaded from disk, analyzes meals keyed into the system by visitors. Each meal is assessed for vitamin and mineral content, fats, calories, protein and carbohydrates. The system not only prints out all of the values for each meal, but compares them with U.S. Recommended Daily Allowances (RDA).

Tips for Improvement

If a person's diet has some nutritional shortcomings — Bauman indicated that most do — the system's CRT displays foods that could be eaten to counterbalance the shortage.

About 70% of those who have submitted menus to the traveling computers and to the system residing at the Minneapolis Library get less than two-thirds of the RDA of vitamins, while 55% get less than two-thirds of their RDA and too few calories. Regardless of calorie intake, nearly half the menus analyzed contain less than two-thirds of the minimum allowance of vitamins A and C, Pillsbury's Marlene Johnson said.

Even people who consider themselves smart eaters make mistakes; in fact, 99% of those who have submitted a list of the day's food intake to the Pillsbury systems are judged to have taken in less than two-thirds of their minimum daily requirements, Johnson observed.

Surprise at Diets

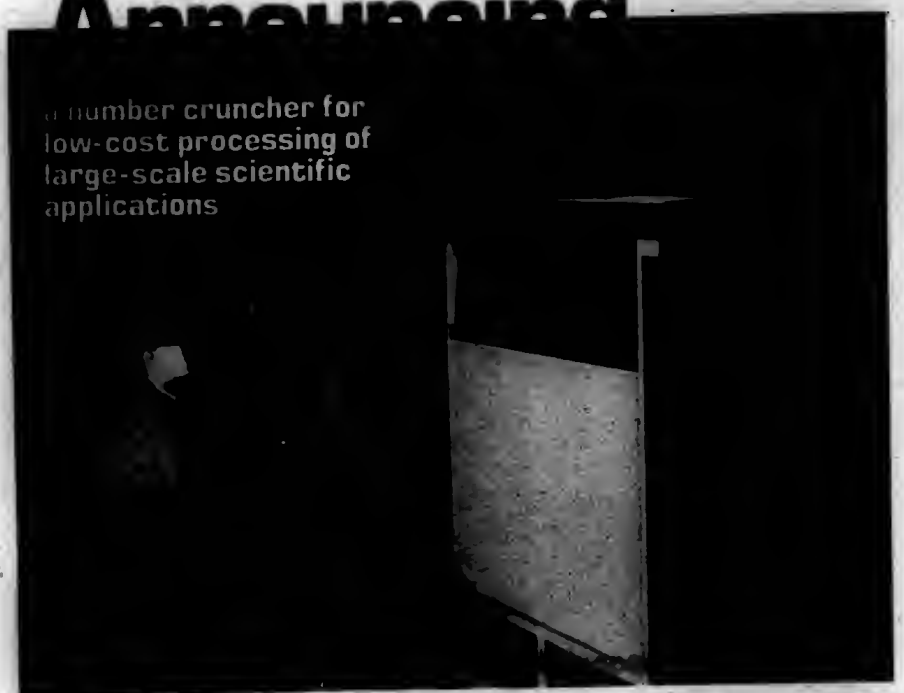
When one system traveled to the Department of Health, Education and Welfare's Food Conference last year in Washington, D.C., people there often expressed surprise that their own diets were not as balanced as they might have thought, Bauman said.

"It's one thing to visualize and add the intake in your mind and another to compare it with what the computer prints in black and white," he said. Participants regularly submitted another food list to see if they could come up with a better, more balanced menu. "It was a good education for them," Bauman added.

The Pillsbury nutritional analysis program is now available to Minnesota school systems through the Minnesota Educational Computing Consortium.

Announcing

a number cruncher for low-cost processing of large-scale scientific applications



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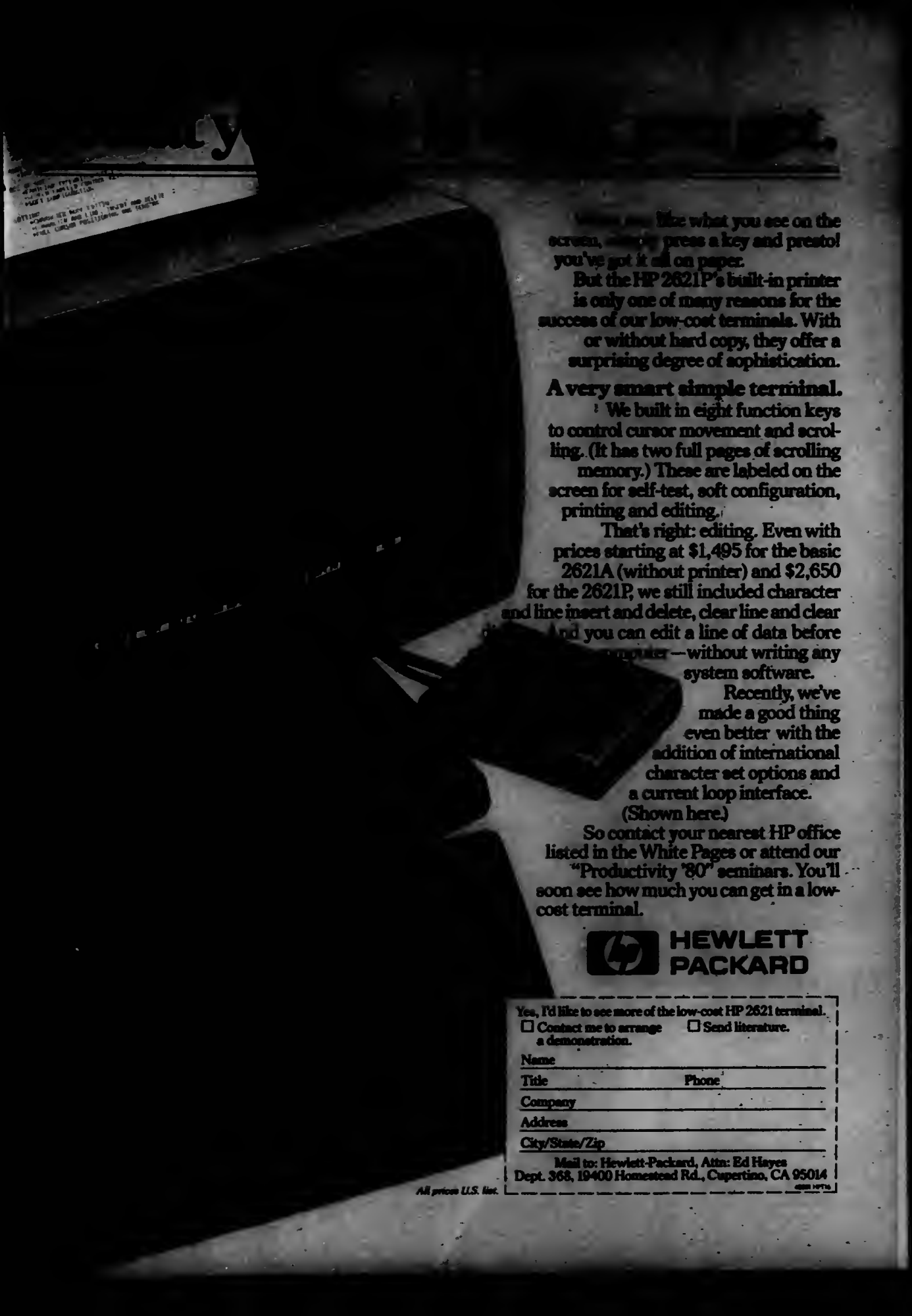

like what you see on the screen, press a key and presto! you've got it all on paper.

But the HP 2621P's built-in printer is only one of many reasons for the success of our low-cost terminals. With or without hard copy, they offer a surprising degree of sophistication.

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So contact your nearest HP office listed in the White Pages or attend our "Productivity '80" seminars. You'll soon see how much you can get in a low-cost terminal.

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Handicapped DP Students Graduate

By Jeffry Beeler
CW West Coast Bureau

BERKELEY, Calif. — A small group of DP students attended a simple and yet highly unusual graduation ceremony at the Claremont Hotel here on May 15.

In one way or another, all the graduates are physically handicapped, and for each, the ceremony means much more than just the successful completion of a course of study. It means, in many cases, a ticket to a brand new life.

The graduates are the product of a DP training project administered by the Center for Independent Living here, an organization that specializes in rehabilitating the handicapped.

Funded by the California Department of Vocational Rehabilitation, the DP project was formed five years ago by IBM to retrain physically handicapped people for jobs as entry-level application programmers for business and industry. Since then, the program has produced 64 graduates, 62 of whom have found work as business application programmers in a wide assortment of companies throughout the San Francisco Bay Area.

Today the project's enrollment totals 26, with the students divided unevenly into two nine-month training classes, which run roughly concurrently. One class of 16 is expected to finish its studies and graduate in September. The other class of 10 on May 15.

Student Mix

Traditionally, graduates have ranged in age from 20 to 50, and their physical disabilities have spanned the full handicap spectrum, according to the project's contract supervisor John Velton.

Some students have suffered from congenital defects like blindness and deafness, while many others have been involved in motorcycle wrecks and other traumatic accidents that have left them severely paralyzed or otherwise disabled and incapable of returning to their former jobs.

But despite their many differences, almost all the students are united by at least one common trait: a powerful motivation to succeed, both in the training program itself and in their ensuing professional lives.

For most of the enrollees, graduation from the program means a chance to make their own way in the world, achieve a measure of self-respect and, in general, live as fully and productively as any of their nonhandicapped counterparts, according to Del Monte Corp.'s administrative services manager, Jean Martin, who sits on the project's business advisory committee.

Applicant Screening

Each applicant to the program is rigorously screened for suitability prior to admission and is thoroughly tested by trained counselors for traits like motivation and job skills, Martin said. Although a few of the applicants boast a smattering of programming experience, most come to the course as total DP novices.

If admitted to the program, the students soon find themselves immersed in an intensive training regimen that begins with a two-week introduction to the DP fundamentals. Next comes an exposure to Basic, after which the course proceeds to its main subject, Cobol.

In the meantime, the course also stresses documentation and covers topics like OS/JCL, IBM core-dump analysis, IBM assembler language and structured design, Martin added. A typical day in the program consists of two 90-minute lectures supplemented by four to five hours of "lab" work in which the students get an opportunity to design, write and test their own programs.

Faculty Members

The project's faculty consists of two full-time instructors plus several part-timers, most of whom are business DP professionals currently working in the field.

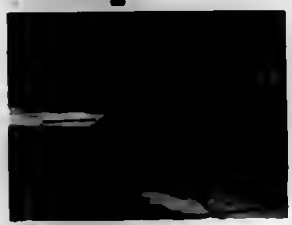
For the last six months of the program, the students take part in unpaid internships during which they typically work 40 hour/week as programmer trainees for large Bay Area businesses. In addition to giving the students their first genuine taste of professional programming experience, the internships often lead to permanent jobs as soon as the six-week training periods end, Martin said.

In the program's first five years of existence, its instructors and administrators have yet to receive a single complaint about any of the 62 graduates they have placed as professional application programmers, Martin added. In fact, several "alumni" who were originally hired for entry-level positions have since been promoted to higher level jobs.

'Do You Have Any That Just Say "Error" Instead of "Dummy"?'

WORTHINGTON PUMP, Div. of McGRAW EDISON, a major manufacturer of industrial pumps, utilizes MDS SERIES 21 Systems.

The Information Pump



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Salvages Experience and Expertise

Plato-Based Plan Lets Disabled Work at Home

By Bruce Heard
CW Staff

MINNEAPOLIS — Just when they though their careers had ended, many disabled people have found a computer-based program that is putting them back to work in their own homes.

The program is called Homework, and Control Data Corp. is using it to salvage experience and expertise that would have otherwise been lost.

Developed by CDC, Homework was built around the firm's computer-based education system, Plato. With Plato, participants learn programming and related skills which they use to develop new application software and educational courseware for the Plato system.

The program has two goals, according to CDC spokesman W. M. Shaffer. It allows CDC to keep its good people and allows the workers to continue to support themselves and derive the kind of job satisfaction they are accustomed to.

Terminal Capabilities

The Homework training period can last anywhere between three months and a year. Trainees proceed through the modules of lessons at their own pace as they are instructed by the terminal and text materials. Once they return to work, the Plato terminal automatically logs their active hours.

The terminals are equipped with a keyboard featuring an unlimited character set that allows the user to designate each key as a letter, word or other object best suited for his means. There is also a touch-sensitive CRT screen which receives tactile commands from users who cannot, or prefer not to type.

The terminals are linked by dial-up lines to three CDC Cyber 730 CPUs at the Plato network data service center in Arden Hills, Minn. Each Cyber system has 128K bytes of main memory and a shared two million-word extended core memory.

Communication with others is important to housebound employees. The Plato terminals enable participants to keep in touch with coworkers and supervisors and also attend staff meetings several times a month.

The psychological lift of returning to work has done wonders for people like Joan Saladin, a former administrative assistant for CDC in Dayton, Ohio, who suffered a ruptured brain aneurism and subsequent stroke in 1974. At the time, doctors gave her only a 20% chance of living and virtually no chance of resuming her career.

Saladin beat the odds, but her speech was badly slurred and she had to learn to walk again when she left the hospital. Today, speaking normally, she commented on her experience.

"I wanted to die. I was a vegetable. I didn't realize I could do anything of value again," she said.

She recently completed her Homework training and now works as a data entry clerk. Her independence from social security was a great boost for her confidence, she said.

Forty people are presently involved with the program, and one other beside Saladin has returned to work full-time with CDC. The early program emphasis on courseware development has been broadened to include other subjects such as business applications programming.

On the Horizon

Other possibilities are on the horizon, according to K.L. Anderson, program manager for Homework. "As the program becomes more sophisticated, we will be able to take persons with special skills and let each have a choice of job training alternatives."

Company officials think the concept will also eventually become useful to the able-bodied population. According to them, there are many jobs which could be performed in the home, and eliminating the need to commute would help alleviate the national energy crisis.

CDC has plans to market the Homework concept and has already had inquiries from several companies, all of which were not DP-related.

If used on a widespread basis, CDC feels the program could greatly reduce the social costs of maintaining incomes for the 4.7 million unemployed and disabled Americans between the ages of 16 and 64.

Walker Again ICCP President

HOUSTON — Merton R. Walker, assistant vice-president for State Farm Insurance Companies, has been reelected president of the Institute for Certification of Computer Professionals (ICCP).

Walker has served on the ICCP board since 1974.

In other election results, Roland D. Spaniol, director of computer services at Eastern Illinios University, won the post of vice-president, and Thomas W. Briggs II, president of American Resource Systems, Inc., won out as secretary. Robert P. Campbell, president of Advanced Information Management, Inc., was elected treasurer.

THE 4300

A TRANSITIONAL SYSTEM?

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"What is involved to converting to DOS/VSE? Should you make the investment when MVS could be available shortly?"

"ICCF gives you not only on-line editing, but also on-line interactive debugging. Are you aware of the significant program and people implications?"

"What are the limitations of a 4300 in a distributed network environment? Are the necessary controls and interfaces in place today?"

"If you have ordered a 3310 and or 3370 DASD, what are the implications for ISAM files?"

"Are the performance claims myths or realities? Will the 4431 really meet your needs?"

Recent user experience, problems encountered in 4300 implementation, combined with rumors that DOS/VSE might be replaced by MVS within two years, could lead managers to the conclusion that the 4300 facilities available today will be very different in two years' time.

SEMINAR ANNOUNCED:

To answer questions such as these, Advanced Systems, Incorporated is pleased to announce a unique one day Management Planning Seminar based upon 4300 installation experiences throughout Europe and the USA. This is your opportunity to benefit from the knowledge gained from those who have already installed the 4300. Their experiences have both raised a number of important issues and can give you significant guidance in implementing your system.

This *practical* seminar is designed to help you recognize, understand and address these concerns and as such, provides a unique insight into the 4300 systems.

There will be four (4) major sessions:

1) "4300 Hardware—description and assessment"

The first topic describes 4300 hardware in terms of its functions and facilities, its required environment, and its expected performance and maintenance considerations. It also clarifies a number of misconceptions relating to 4300 efficiency.

2) "Converting to 4300 Software"

In this session we will examine the DOS/VSE, VS1 and VM Control Programs and their available licensed products. Problems which are inherent in conversion and updating to these operating systems will be described from field experience and discussed in some detail. System IPO/E will be described and problems that have been encountered, which have caused some people to abandon the SIOP/E environment, will also be examined.

3) "Local and Remote Interactive Facilities"

In this session there will be discussions covering the 4300 in an interactive environment. Special attention will be paid to the interactive products of DOS/VSE, ICCF, IPS, and ICPS. The impact and limitations of ICCF with multiple users will also be addressed as well as the interrelationships between ICCF and other interactive packages (for example CICS).

4) "Support and Future Trends"

In the final session the following questions will be discussed: What kind of support can be expected in light of the remote support facilities—does this represent a significant shift in IBM policy? What are the people resource requirements and therefore, training implications? What growth paths will be available to 4300 users? What planning will be required? Finally, is there any truth to the speculations that MVS will become a 4300 standard in the next two years? What other hardware options are likely to be announced?

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Mini Net Lets Firemen Answer 10 Alarm/Min

By Jay Woodruff
CW Staff

NEW YORK — What has more firehouses than Citibank has branches? The answer is Starfire.

Starfire is a minicomputer-based dispatching network that helps firefighting personnel in 323 fire stations cope with up to 10 alarms a minute throughout the five boroughs of this city, according to John Mohan, director of the fire department's Bureau of Information and Computer Services.

When an alarm is telephoned in or registered in any one of approximately 20,000 alarm boxes, dispatchers use information from the system to help decide how best to combat that fire while at the same time remaining prepared for the next alarm.

Since its alarm box system was installed 55 years ago, the number of alarms has increased sixteen fold while the fire-fighting force has remained the same size. In 1979 alone, 470,000 alarms were logged, Mohan attributed the increase mainly to the age of the city's buildings and to the number of arson-related fires.

Worse than that, the half-century-old alarm box system was causing unequal work loads, increased delays in dispatching and reduced ability to respond to alarms, especially if a group of alarms was reported simultaneously.

The computer-assisted system was phased in on a stand-alone basis in Brooklyn three years ago. Manhattan and the Bronx were added later, and Queens and Staten Island will follow in October.

The system is based on a pair of Digital Equipment Corp. PDP-11/70 minicomputers, one acting as a "hot" standby. They act on information passed on from an alarm site through a pair of unattended PDP-11/34 minis in each borough and suggest to dispatchers what companies in the area can respond.

Response Time

The $15 million system can order a firehouse unit to a fire in less than 40 seconds from the time of the sounding of the alarm at the call box or the call from a witness. At the same time, it can, if necessary, order other firehouses in the area to send units to the area normally under the protection of the original unit.

Starfire's system supervisor, who coordinates the 15 dispatchers under his command, stays on top of daily incidents by accessing information on a CRT terminal or by glancing at a minicomputer-driven, 12-foot high display board of all 323 firehouses in the city. Two maps sit side by side, denoting the fire trucks or hook and ladder trucks available in each area.

Each firehouse is marked by a light. If it glows red, the company is out on call; if white, it is traveling; and if green it is ready for service. In either the fire truck or hook and ladder category, the supervisor can immediately see how well the fire-fighting apparatus is distributed, Mohan said.

Should one section of the city be particularly busy with calls, resulting in lack of protection for that area, the supervisor can order the computer to assign idle companies from other areas to move into the empty firehouses. This allows New York to maintain its capacity for rapid response even when many calls are coming in at once. Such a capability was simply not possible before this, the director explained.

System Redundancy

Redundancy reigns supreme in the Starfire system. Nearly all failures in the system can be corrected by an extra processor or line connecting the pieces of the network, he claimed. If one processor goes off-line either as a result of a failure or for repairs, the second mini or micro in sequence will be switched on-line by the PDP-11/70s. System software changes can be downloaded over data lines, according to Mohan.

At each borough headquarters is a small display map of the borough; the map is driven by the in-house minicomputer. Should the minis fail because of power blackout or some other cause, the display — which is based on dual Intel Corp. 8080 microprocessors — will continue to operate by means of its own batteries.

A similar battery-powered system operates at headquarters. In the event of a power failure, a small display provides the basis for moving to an entirely manual system of dispatching fire-fighting equipment. This redundancy should make it difficult to completely disable the system, according to Mohan.

How is the system operated? A dispatcher answers an alarm by typing the street address of the firebox where the alarm was entered into a terminal especially designed and constructed for the department by Megadata Corp. If the call was placed on one of the city's newer call boxes — which incorporate voice communications — the operator can ask the person who pulled the alarm for more information about the fire and enter it into the terminal.

The ability to get extra information is put to good use by the Starfire system. For example, if a fire is in a tenth-floor

(Continued on Page 39)

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IRS Won't Use Credit Firms to Track People

WASHINGTON, D.C. — When it comes to tracking down people who move without notifying the Internal Revenue Service (IRS), good old-fashioned footwork is just as fast as computerization, according to IRS top brass here.

The officials recently scrapped plans to employ commercial credit bureaus and to use Social Security numbers as cross-checks to catch up with approximately 5,500 such citizens. The plans were scrapped, according to a spokesman, because the IRS felt its agents could move just as quickly using manual search methods.

"We haven't [used computers] before and we're not going to do it now," IRS spokesman Larry Batdorf said. He added that the decision to request bids from the major charge-card credit networks was a low-level decision and was scrapped as soon as it reached the IRS higher-ups.

Although Batdorf contended the plan was scrapped because the IRS felt it just would not offer much greater efficiency than the current manual system, some say the plan was discarded because none of the credit networks would bid on it.

In addition, the idea of using Social Security numbers as cross-checks drew some questions from privacy experts as to whether the procedure was, in fact, legal.

Ronald Plesser, former general counsel of the U.S. Privacy Protection Study Commission, called the Social Security cross-checks "questionable" in light of the Privacy Act, according to published reports.

Batdorf, however, claimed the IRS plan would have been legal in light of special privileges granted to tax collectors under the Privacy Act. He cited as an example the long-standing practice whereby tax collectors use a citizen's bank or stockbroker as a source for a forwarding address.

The scuttled plan might also have caused some anger because it was a possible violation of the Fair Credit Reporting Act, which allows consumers the right to know who has been checking their credit. The possibility exists that credit network personnel could tip off banks and other creditors that an individual was under IRS investigation. That kind of disclosure would have been illegal under the IRS plan, Batdorf said.

Mini Net Links Firehouses

(Continued from Page 38)

apartment, the computer will suggest only those companies with ladder trucks capable of reaching at least that high. This reduces the possibility that ineffective equipment would be sent, the director said.

If the dispatcher approves of the computer's choice of company, he will push a button to request a response from that fire company. The alarm will go off within the firehouse, and a Megadata printer terminal will print out the address of the fire.

If the firehouse can respond, an operator there will push a button labeled "10-4." If no response is possible, a "10-14" button is pressed, and the computer automatically selects a substitute company, Mohan said.

Planning for the Starfire system began in 1968 and the first bid to build it was taken in 1973. The original plan placed operators at each of the borough headquarters to feed information to fire department headquarters, but bids of $37 million and $40 million greatly exceeded the $20 million budgeted for the effort.

The project was redesigned by Mohan, the fire department and the planning firm of Bradford National Corp. Money was saved by centralizing the system and employing dispatchers only at fire department headquarters. This reduced the number of required dispatchers from 40 to 15. Total system cost dropped to $15 million, well under the allowed spending limit, Mohan said.

The system can be called upon to generate a variety of reports on system performance, but the most telling report describes response time.

Information on system performance should help the fire department configure its operation to respond more rapidly to emergencies.

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Small Museum Puts Inventory on Diskette

By a CW Staff Writer

FRAMINGHAM, Mass. — The aesthetics of art are being converted into cold, hard computer data in the form of a computerized inventory at Danforth Museum, a fine arts museum here.

The relatively young museum started from ground zero five years ago. Today it has approximately 700 paintings, prints, drawings, sculptures and other works of art in its collection. Until recently, all recordkeeping was performed manually; a lot of time was spent attempting to find specific information about any of the 700 works of art.

Museum President Paul Rosenberg decided that in order to save manpower and time, the museum needed to automate its records. Instead of contracting for the work from a software house, however, Rosenberg — a computer hobbyist — volunteered to write the programs himself and to run the programs on his company's IBM 5110 system in off-peak hours.

Rosenberg is financial vice-president of Technical Operations, Inc., a Boston-based manufacturing and services industrial products firm. With the help of Technical Operations' chief accountant, Rosalee Albanese, Rosenberg developed the inventory and sort programming, which uses 32K bytes of memory and is written in Basic.

The project requires a minimum of computer time — only a couple of hours a month, according to Rosenberg. Museum personnel code inventory details on input sheets, which are stored on diskettes. The diskettes serve as an off-site repository for security and documentation purposes and are readily available whenever processing is required.

The data is used for cataloging, research on future collections, possible loan practices, tax purposes and as insurance against losses through theft or fire. Compiling this information manually would have taken hours of sorting through files and transcribing information.

Each piece of art in the permanent collection is listed by acquisition number, artist, title, date, medium, size, donor, insurance value, acquisition cost and date acquired. Any requested information is run out on printouts.

Since the system was implemented, several museums of similar size have expressed interest in the project. Rosenberg noted the program is available for sale; proceeds will go to the museum.

The Danforth Museum in Framingham, Mass., has stored the inventory of its 700-unit collection on diskette.

Help Requested From Museums With DP Savvy

LAWRENCE, Kan. — Any institution that has experience in applying computers to museum collection management activities is being called for help by the Association of Systematics Collections (ASC).

Funded by the National Museum Act, ASC is undertaking a one-year project to identify institutions that have computer projects, to collect information on each identified installation through questionnaires and on-site visits and to analyze the difficulties encountered when applying computer automation to collection management activities.

Representatives from institutions who can contribute to the survey should contact Lenore Seresan, Survey Director, 2808 Sheridan Place, Evanston, Ill. 60201, or the ASC, Museum of Natural History, University of Kansas, Lawrence, Kan. 66045.

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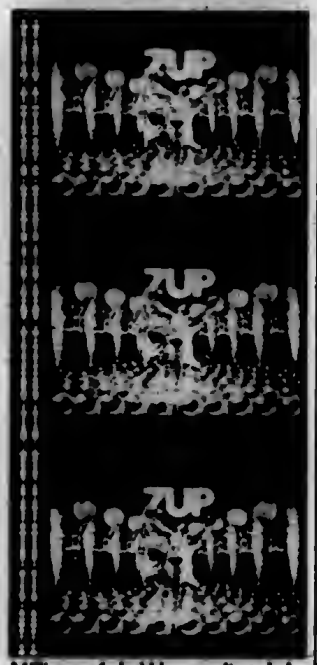
Millions in DP Gear Create 30-Second Job

Special to CW

HOLLYWOOD, Calif. — While your average TV addict may not realize it, creating special effects for a 30-second commercial can take up to three months and require nearly a million dollars of computer and related hardware.

Robert Abel, head of Abel & Associates, a special-effects studio, is an innovator in computer-controlled film



Millions of bubbles, replicated by computer with the aid of a disk mass storage system, went into the creation of an award-winning 7UP commercial by Abel & Associates.

images and has used DP tools to put together award-winning commercials for such companies as Levi Strauss & Co., AT&T, RCA Corp. and TRW, Inc. His nondescript studio in the heart of Tinsel Town contains as much computer gear as any large business, including four Digital Equipment Corp. LSI-11 microcomputers, two PDP-11/60 minicomputers and an 80M-byte System Industries, Inc. disk and controller.

However, instead of using these computer systems for general ledger or housekeeping duties, Abel interfaces them with cameras to create, duplicate, replicate and store images.

"Until six or seven years ago, the concept of automating anything in our business — or in fact running it by computers — was so outlandish that nobody even really cared to think about it," Abel observed. But "we're in a position now where it would be impossible to do special effects without computers."

Animations require a wide range of movements for special effects — north, south, east, west, track, pan, bank, yaw, pitch and rotate, just to name a few. A single shot for a commercial or motion pictue may take 100 different exposures in the camera, plus 100,000 bits of information, the special effects expert noted.

The computer hardware at Abel & Associates includes Oxberry animation cameras and computer-generated Evans & Sutherland Computer Corp. imaging systems. The four LSI-11s control several Oxberry cameras — specialized animation units that travel on tracks.

The two PDP-11/60s and the System Industries disk and controller were put on-line in 1978 to make time-sharing possible. Before that, four PDP-11/03 minis were used to do the job. The PDP-11/60s run under the RSTS/E

(Continued on Page 42)

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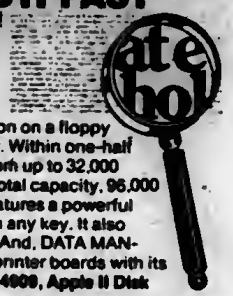

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5. I want to know how I can cut storage costs with System Industries. Please have a salesman call today. ☐ Yes ☐ No

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Millions in DP Gear Creates 30-Second Work

(Continued from Page 41)

operating system and let Abel & Associates move files when needed.

Off-line storage for the PDP-11/60s is on the order of 2G bytes. Future plans call for installation of a DEC VAX-11/780 with a System Industries 300M-byte disk storage system.

Although Abel & Associates is equipped to handle most average commercial assignments, some ventures require a full-capacity effort from the company's six computer systems and more than 50 employees.

For instance, when a recent 7Up commercial called for a series of bubbles, animators worked with the computers to create graphics for nearly 100 million bubbles that would be used in the 30-second spot, according to Grant Snellen, Able's director of electronics.

'But no matter how sophisticated the computers and machines . . . the key to a successful commercial lies in the hands of the artist. The computer is merely a tool.'

Projected with an Evans & Sutherland vector graphics unit — originally developed for flight simulation applications — the computer-generated bubbles were first filmed in black and white to check on the animation, then photographed in color for the final production.

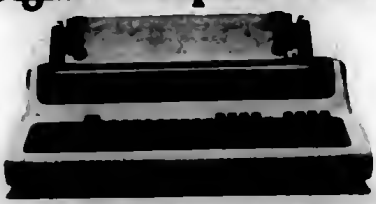
Command Language

To produce the computer-generated images and to control camera movement, the firm uses a specialized command generation language that allows Abel's technicians to plug in different parameters for each commercial. The latest command language, Latent-Image Optical Recording Instrumentation (Lori), was developed by Abel workers and is constructed with DEC's assembly language, Snellen noted.

But no matter how sophisticated the computers and machines at Abel & Associates, the key to a successful commercial lies in the hands of the artist. The computer is merely a tool. "We try to provide the creative tools which allow [the artist] total freedom in his area of creativity," Snellen, a former DEC employee, stated. But "we also want to let him communicate on his own terms."

Grant Snellen (top), director of electronics, keeps the computer-controlled imaging system running. In bottom photo, he operates an Oxberry animation camera, controlled by micros.

Terminals now sold at Digital's Computer Stores.



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Ad Agency Using a Different Type of Model

By Tim Scannell
CW Staff

CLEVELAND — Computers and computer models are playing an increasingly more important role in the heated battle between Brand X and higher priced spread.

At least one advertising agency is currently using an in-house minicomputer and a variety of software programs with such formidable names as "Planner" and "Probe" to find out exactly what strikes a consumer's fancy about a certain product. Armed with a Hewlett-Packard Co. HP 3000 Series 33, Wyse Advertising, based here, not only examines the various good and bad points of a client's product, but also maps out a marketing strategy to promote the product and capture the buyer's eye.

For instance, utilizing one of the agency's more advanced projection programs, the computer can be used to tell how successful an advertising campaign might be if it focused on certain product attributes, according to Anne M. Duerig, Wyse's research director. The computer is even programmed to take into consideration people's product perception in different parts of the country and to react to the strategies of competitive campaigns.

A Step Further

Like any type of analysis system — computerized or not — the Wyse system depends upon data collected through normal interviewing techniques, including over-the-telephone queries and person-to-person surveys. If, for example, the agency were examining a client's fruit juice, the data might concern whether a consumer thought the product was too sweet or too sour as well as how much a person would be willing to pay for it.

The collected data is entered into the HP 3000 through several on-site terminals. From this basic information, the ad agency can produce simple cost tabulations for the client to show how much consumer interest there is in a product and even hint at where in the country to boost advertising.

But the Cleveland-based ad company takes this cursory inspection procedure a step further, Duerig noted. Using its proprietary Planner software, Wyse can create a computer model that juggles the various attributes of a product into a workable formula.

For example, the model might show that consumers in one part of the country would be more inclined to buy a certain candy bar if it were advertised as being nourishing as well as satisfying to the sweet tooth.

"By doing this with the various attributes, we are then able to determine which ones would have the greatest impact or market share," Duerig explained. "These are the ones we most seriously consider either as advertising objectives or . . . product development objectives."

The same set of programs can be used to tell what would happen to the product's market impact if the consumer's awareness of that product were increased. For instance, a certain jam produced and taken for granted on the West Coast is considered almost a gourmet item in the midwestern and eastern states, Duerig said. While additional advertising in California might not increase sales there, increasing the number of ads in Boston might increase the demand for the product in that city.

The Planner model also considers such consumer points as who is buying a particular product, how a competitor's brand stacks up against that product and how important this product is perceived to be in the general marketplace, Duerig pointed out.

'Conjoint,' 'Probe'

A second program group called Conjoint can be used to determine which products or services in a group of similar products a consumer would buy. Authored mostly by Bell Laboratories, Conjoint can handle only a few product characteristics at a time. It is useful in determining not only what attributes a consumer looks for in a product, but whether the attributes are even needed, Duerig said.

The Conjoint program can also compare the views of owners and nonowners of the product and perform a lot of the functions contained in the Planner routines.

Finally, the company has a program that is used to evaluate the overall strategies of a client and tell which products or product areas should be investigated, based on the client's capabilities. The Probe program is useful in developing new product ideas and eliminating the cost-wasting "crazies," Duerig observed.

Wyse has a number of other programs that evaluate everything from test market performance and forecasts to customer loyalty. While most of the firm's programs are run in-house on its 256K-byte HP system a few are kept on an off-site IBM mainframe, accessed through a time-sharing terminal. However, plans call for bringing these nonresident programs home in the near future.

Programs for Others

In addition, Wyse someday plans to offer its programs for use to other advertising agencies on a time-sharing basis.

Doing this, however, would not give the competition any edge over Wyse, since the name of the game in advertising is creativity and campaign effectiveness.

Good news for Word People.

In business, there are basically two kinds of people.

Word People. And Numbers People.

If you're a Word Person, this ad is for you.

And so is this new machine: The Xerox 860 Information Processing System.

It can rearrange paragraphs, change margins, correct misspellings and type out a virtually endless series of text revisions at the speed of hundreds of words a minute.

And it remembers everything it's done for future reference. Or additional changes.

But it also does something you might not expect from a word processing system.

It processes numbers.

Because in business today, Word People have to manage numbers. And Numbers People have to manage words.

And everyone, but everyone, has to manage information.

XEROX

XEROX and 860 are trademarks of XEROX CORPORATION.

By Monitoring Game Flow

Micro-Based Unit Plays Ball for Brigham Young

By Bruce Hoard
CW Staff

PROVO, Utah — The basketball and tennis teams at Brigham Young University (BYU) have each had an extra member this year, but the competition has yet to call "Foul."

This is because the extra member is a computer and, while its use may be inventive, it is not illegal.

The Timed Interval Categorical Observation Recorder (Ticor) is a portable, battery-operated data entry device based on a microcomputer. It was designed to automate the collection of sequential and simultaneous behavioral observations. Athletically speaking, that means a coach can monitor the flow of a game and determine when players are doing well or poorly.

Originally developed by BYU educational psychologist Dr. Rex Wadham as a tool to investigate human interaction, Ticor has been enhanced to the point where it can evaluate teacher performance and monitor biological functions, the psychologist said.

Scoring the Team

The BYU basketball team uses Ticor to maintain game statistics. That process takes one person to call out individual statistics — such as rebounds, field goals and blocked shots — and another to enter them in Ticor via its keyboard, according to Nancy Groberg, who operates Ticor at home basketball games.

The data is recorded on micro magnetic tape and processed on a Zeta Computers International, Inc. Model 580 minicomputer with 61K bytes of main memory. The Model 580 then returns its analysis on dial-up lines to a CRT terminal nestled at the feet of basketball coach Frank Arnold.

Arnold can then determine such variables as the percentage of his team's shots being made in comparison with the corresponding percentage for the opposition, the number of rebounds each team has and the length of time a player has been in the game.

Any coach could benefit from information gathered from a source other than himself, according to Dr. Adrian Van Monfrans, director of BYU's McKay Institute, which coordinates all the research efforts involving Ticor.

Decisions regarding the management of players during a game can be more intelligently rendered when based on computer output instead of on human intuition, in Monfrans' opinion.

Monfrans expressed hope that Ticor would eventually become capable of performing such complex and subtle variables that it will be able to determine just when the amorphous sports phenomenon known as "momentum" is about to swing from one team to another.

Coach's View

One person who would benefit from increased Ticor capabilities is Arnold, a 22-year veteran of the basketball wars. Although he welcomes the computer's help, he bristled at the idea of being replaced by Ticor or any other computer.

When asked if he would depend on Ticor to make key game decisions, he replied, "I am not going to rely on a machine when I've been in the business this long. I can make those judgments myself."

The coach did acknowledge the usefulness of Ticor and lauded it for being able to track 36 statistical categories as opposed to the previous 12, which were kept manually. Some of those additional categories include defensive mistakes, internal passing and lack of hustle.

Using mostly Fortran, Craig Teerlink wrote the sports software for BYU's basketball and tennis teams. The tennis program involved no analysis and is little more than a sophisticated tally summary, Teerlink said, adding that it took between 60 and 80 man-hours to program.

Although there are program enhancements planned for the basketball program, Teerlink refused to divulge them. It looks like BYU wants its extra team member to remain proprietary.

Good news for Numbers People.

In business, there are basically two kinds of people.

Word People. And Numbers People.

If you're a Numbers Person, this ad is for you.

And so is this new machine: The Xerox 860 Information Processing System.

It can compute, do statistics and perform the routine work that's essential in managing records, measuring work performance and so on.

And it remembers everything it's done for future reference. Or additional changes.

But it also does something you might not expect from a numbers processing system.

It processes words.

Because in business today, Numbers People have to manage words. And Word People have to manage numbers.

And everyone, but everyone, has to manage information.

XEROX

"See us at NCC booth #2436"

Course via Plato For Managers

MINNEAPOLIS — Control Data Corp. is now offering a self-paced, computer-based education course to introduce managers to current DP concepts and techniques.

The course is part of CDC's Plato system and is directed at middle management of large companies and top management of smaller companies installing DP systems.

The course reportedly can be completed in seven hours or less.

The course costs $155 at any of CDC's 85 nationwide learning centers. Prices for larger organizations subscribing to the Plato system on their premises vary with the number of users taking the course, the company said.

A single subscription costs $1,510 for videotapes and textbook, plus an average $3/hour computer contact charge, the vendor said. More information is available from CDC at Box 0, Minneapolis, Minn. 55440.

Olympic lab gets results in record time

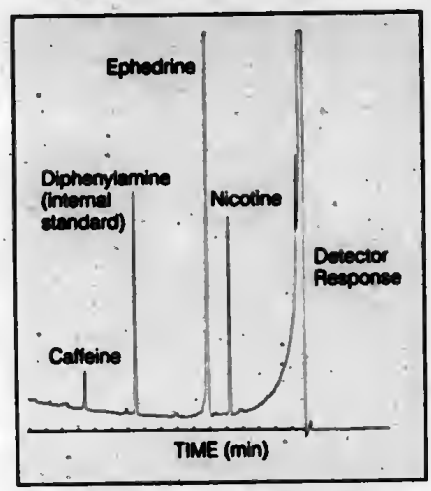
Athletes at the Lake Placid Winter Olympics knew when they were handed a green card by officials that their urine was about to be tested for drugs ranging from stimulants such as amphetamines to muscle-building steroids. With gold medals hanging in the balance, test results had to be fast and reliable.

Much of the drug screening was carried out by chromatography, a technique for separating mixtures of compounds so they can be identified and measured. To handle the heavy volume of test data, the Olympic laboratories were automated with a dozen Perkin-Elmer gas chromatographs linked to six Perkin-Elmer SIGMA 10 Chromatography Data Stations.

By bringing the power of the small computer into the laboratory, the SIGMA 10 makes it possible to collect and analyze data from a number of samples in less time than it once took to perform a single analysis. With a powerful microcomputer and memory for its "brain" and versatile software for its "intelligence," a single Chromatography Data Station can guide the operator and handle up to four simultaneous analyses.

At Lake Placid, data stations controlled operation of the chromatographs, processed the data generated, and printed the final reports. In other environments, they also can function as part of a network of "distributed intelligence," trading data with a computer and interacting with other "intelligent" laboratory instruments.

Write to Perkin-Elmer for a free booklet about laboratory data handling and automation systems.



Chromatogram reveals presence of ephedrine, which dilates respiratory passages to increase oxygen intake. Other peaks indicate smoking and coffee drinking.

Data station automates trace metal search

How much sulfur is in this coal? Does this canned milk contain lead? Is this well water too high in iron?

To answer such tough questions, analytical chemists turn to atomic spectroscopy, a method of measuring traces of metals in concentrations as low as one part per billion.

The three most common atomic spectroscopy techniques are flame

atomic absorption (for rapid determination of up to six elements), graphite furnace atomic absorption (for trace and microsample analysis), and the newer inductively-coupled plasma emission (for multielement analysis and for elements that can't be readily determined by atomic absorption).

In the new ICP/5000 System, all three techniques are combined for the first time, automated by microprocessors and controlled by a Perkin-Elmer intelligent data station.

It can answer those tough questions by using the best analytical technique for each: inductively-coupled plasma emission for analyzing sulfur in coal, graphite furnace for measuring lead in canned milk, and flame for analyzing iron in well water.

Once optimum parameters have been recalled from memory by the analyst, the data station takes over. It selects wavelengths, calibrates, tells the operator when to analyze the sample, indicates any error, displays and prints the results.

With its Autosampler, the ICP/5000 System can also sequentially analyze as many as 50 samples for up to 20 elements automatically.

The results will tell you whether the coal is harmful to the environment, whether the milk is safe for your child, and whether you should drink the water.

For your copy of a free brochure on the ICP/5000 System, write to the address below.

Perkin-Elmer computers speed lab data to doctors

The clinical laboratory of Houston's M.D. Anderson Hospital and Tumor Institute, one of the largest cancer centers in the world, performed more than two million tests last year. Data from these tests and thousands more on file must be instantly available via CRT terminals to doctors throughout the hospital.

But as the volume of tests climbed over the two million mark, the computer in the clinical laboratory began to blink "overload." In a comprehensive reliability study to choose new computers, the hospital ran extensive equipment tests. Two Perkin-Elmer 32-bit "supermini" computers were chosen on the basis of reliability, cost/performance factors and the ability to handle the hospital's growing needs.

Using system software developed by the hospital, lab data is input via 44 CRT terminals and 18 on-line instruments in the laboratory. The computers output data to the medical staff through 97 CRT terminals throughout the hospital.

Medical team views terminal outside operating room to check patient's test file stored in lab computer.

With 512 K bytes of memory each, the computers have increased total system memory tenfold. Capacity of the patient data file has been increased from 6,000 to 42,000 patients.

Despite this major upgrading in performance, the new equipment is easy for the staff to use: a few simple instructions are all that's required to enter or retrieve data from the computers.

For a free booklet about 32-bit computers, write to the address below.

For more information

If you would like to learn more about these Perkin-Elmer products for Computer Aided Chemistry, please write: Corporate Communications, Perkin-Elmer, Main Avenue, Norwalk, CT 06856.

PERKIN-ELMER

Responsive Technology

Seminar to Cover Micro Languages

NEW YORK — McGraw-Hill, Inc. will sponsor a conference on "Languages and Tools for Microcomputing" June 16-17 at the McGraw-Hill Conference & Exposition Center here.

The conference will introduce designers, systems analysts, implementers and managers to various high-level languages and associated systems tools now commercially available, McGraw-Hill said.

Subjects to be covered include "The Importance of Tools" by Dr. Fred Martin, executive officer of Intermetrics, Inc; "The Pascal Perspective" by Peter Grogono, analyst/programmer at Concordia University; "After Pascal, What?" by Dr. Kenneth L. Bowles, director of the Institute for Information Systems, University of California; "Trees and Lists as Tools" by Dr. Henry G. Baker Jr., assistant professor at the University of Rochester; "What is C?" by John A. Morse, principal engineer of Digital Equipment Corp.'s Corporate Research Group; and "The Forth Alternative" by Charles H. Moore, Forth, Inc. chairman.

The conference costs $485, McGraw-Hill said from Room 3677, 1221 Ave. of the Americas, New York, N.Y. 10020.

Help Sought for Aila Study On Applied Linguistics In Field of Computation

MONTEREY, Calif. — The Scientific Commission for Computational Applied Linguistics of the Association Internationale de Appliquee (Aila) is conducting a worldwide study in order to prepare a position paper on computational applied linguistics.

Aila is looking for people doing research on applied linguistics as well as information on operational systems and proposed systems that deal with the subject.

The study is being conducted with the support of the Defense Language Institute Foreign Language Center here.

The results of the study will be distributed to participants. Persons wishing to participate can send their names and addresses to Commendant, Defense Language Institute Foreign Language Center, Attention: ATFL-TD (Dr. Arkwright), Presidio of Monterey, Calif. 93940.

First DP Champ In World Chess To Get $100,000

PITTSBURGH, Pa. — A $100,000 prize has been set aside for the first computer program to become world chess champion and a yearly computer vs. human chess competition has been established, according to officials at Carnegie-Mellon University here.

The cash, officially known as the Fredkin Prize, has been provided by the Cambridge, Mass., Fredkin Foundation.

The competition will be monitored by the International Joint Conference on Artificial Intelligence. Carnegie-Mellon will act as a trustee for the prize until it is awarded.

More information is available from the Carnegie-Mellon Department of Public Relations, Schenley Park, Pittsburgh, Pa. 15213.

Nine Seminars Slated for Brazil To Start in June

BETHLEHEM, Pa. — A series of nine DP seminars will be held in Rio de Janeiro and Sao Paulo, Brazil from June through November this year, according to their U.S. sponsor, Long and Associates here.

Several prominent DP professionals will teach the seminars, according to Long. They include "DP/MIS Documentation and Procedures," "Effective Computer Operations," "Structured Testing," "Computer Networks," "Computer Auditing and Control," "Advanced On-Line Systems Auditing," "Computer Performance Measurement," "Structured Programming and Software Engineering" and "Distributed Processing and Computer Networks."

More information is available from Long and Associates' Education Division, 820 Tioga Ave., Bethlehem, Pa. 18016.

BEYOND THE COMPUTER.

Out in that sometimes hazardous network environment, the need is for a powerful communications processing system.

One that provides dramatic line cost savings and is transparent to existing hardware and software.

One that allows you to upgrade your network, not your mainframe.

The Codex 6000 Family of Communications Products.

A capability that solves many of your network configuration problems.

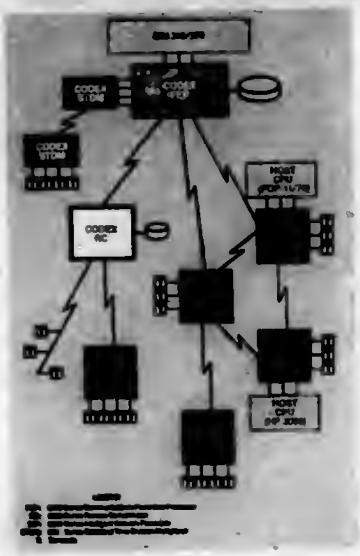
Plus network error detection and correction.

And, a monitoring capability which provides unmatched visibility of network operation.

The Codex 6000 Family consists of new 6500 Communications Front-End Processors providing 360/370 compatibility, powerful 6000 Intelligent Network Processors and 600 Series Statistical Multiplexers.

This kind of capability goes well beyond the computer.

And beyond anything else in its field.



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The Ahwatukee House

MPU-Based 'House of the Future' Protects, Controls Environment

PHOENIX — The house of the future may already exist, controlling its own environment, protecting the building and its occupants, managing electrical consumption and storing information.

Called the Ahwatukee House — a Crow Indian name for "shining house of dreams," the microprocessor-maintained home is being used as a showcase of alternative housing.

Built to harmonize with the Arizona environment, Ahwatukee House responds to human needs "transparently," meaning there is no obvious way to tell a computer is involved, according to Stan Katz, head of Motorola, Inc's. Semiconductor Group, which designed the technology for the house.

To respond to temperature changes in the desert climate, the house's computer system can automatically open doors and windows for passive heating or cooling. Additionally, the system can actively heat the house through solar, heat-pump or resistive electrical heating methods. Alternatively, it can actively cool the house by means of an evaporative cooler, the circulation of chilled water through a heat exchanger in the air ducts or using the heat pump.

The system was designed to choose the best method for the existing environmental conditions while also using the least amount of electrical power, Katz explained.

Security Functions

The system's security functions operate by using smoke and motion detectors. In an alarm situation they would notify the occupants, open the doors and turn on the lights, Patrick

(Continued on Page 50)

If an alarm condition is found, the system can notify the occupants. The display is shown on a standard TV receiver, with a Motorola Exordisk II placed at the top.

"Let your customers key the orders".

Richard Newberry, V.P. Marketing, Phone 1, Inc.

The P1-5 Data Concentrator permits your customers to remotely key their own orders for your products. It will simultaneously answer up to eight calls and provide immediate storage on computer diskettes. Your customers may key their orders on a hand held terminal or simply use their push button dial telephone. Call or write for complete information.

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First Nahautl-to-English Dictionary

CPU Helps Translate Aztec Language to English

By Jay Woodruff
CW Staff

BLACKSBURG, Va. — A computer is helping a professor here in the initial steps toward assembling the first Nahautl-to-English dictionary.

Nahautl is the language of the ancient Aztec empire. It has already been translated into German, French and Spanish, but has never been translated into English.

This lack of an English-Nahautl dictionary forces scholars to translate through another language to arrive at the English meaning of a Nahautl word, according to Franke Neumann, associate professor of religion at Virginia Polytechnic Institute and State University. Neumann decided to do something about it seven years ago and began assembling an English-Nahautl dictionary with his own funds.

Because of the immensity of the task, the professor considered using a computer for text editing. However, a lack of funds forced him to use an IBM 3032 only to format words and their meanings in batch mode into a dictionary-ready form. Neumann now adds about 10 words a day by writing the information on data sheets and then submitting it for keypunching.

The cards are punched at the Virginia Tech Data Center and are then run through the 3032. The professor receives a printout of the words formatted as he would like to see them in the dictionary.

If more money becomes available, Neumann plans to acquire a terminal and use it on-line with the school's other systems — a pair of IBM 370/158s. The system's text editing features would greatly speed entering words and making the necessary corrections, he said.

Word Associations

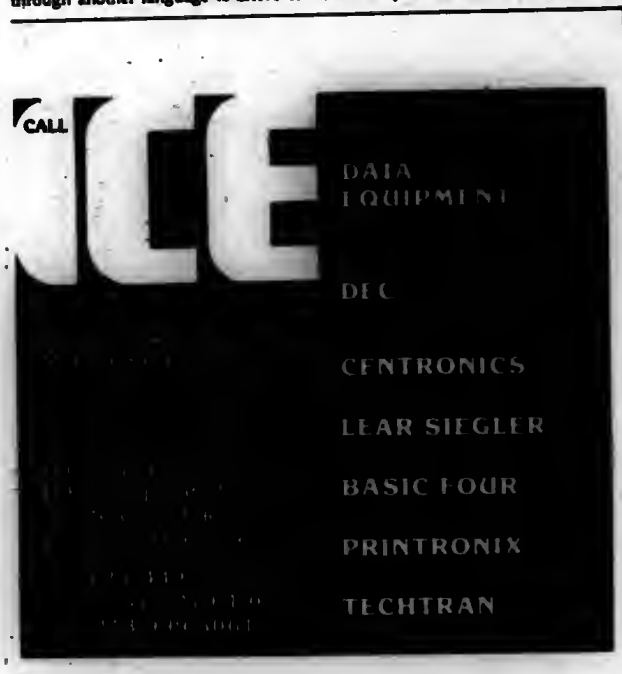
Neumann plans to program the computer to associate as many words as possible to describe a particular idea. Before attempting this, he must assemble the words and their meanings.

"The fun will come when we want to make associations, because the computer will save us mountains of time," he said.

In spite of all the work he has put into the project to date, the professor finds that scholars in the field tend to turn up their noses when they hear about his endeavor. "There is this mystique about Nahautl, that nobody has any business fooling around with Nahautl in English, that it should be translated into other perfectly acceptable languages," he observed.

"I am comfortable working in the other languages, but I do not see any reason why we shouldn't be able to translate directly from Nahautl to English."

So far Neumann is still on the the As, which makes him think the dictionary will become a lifetime project. When completed it will contain from 500 to 1,000 pages.



MPU Controls Future House

(Continued from Page 49)

O'Malley, systems engineer, claimed.

Another aspect of Ahwatukee's security is the absence of any door keys. Instead of the traditional lock and key, a calculator-style keypad near the door is used with a code word to open the doors, he noted.

Electrical load-switching allows control of lights and wall outlets, although light switches can be used manually. Lighting can also be controlled by the time of day, based on the system's real-time clock, or by the presence of people in a room, as sensed by the motion detectors.

Energy conservation is an important aspect of every function of the system, and power consumption can be summarized in detail for the homeowner, according to O'Malley.

Data is entered into the system by using a full Ascii keyboard and is displayed on an unused channel of a standard TV receiver. Files of information can be created on any subject and can be stored in text or graphics form.

The system can also serve as a calendar of events in which appointments or birthdays, for example, are recorded. The owner can call up each day's calendar.

A voice capability was incorporated in the system and is programmed to greet family members by name as they enter the home. This capability is based on the access code keyed into the front door keypad, and it can also announce the correct time on the hour or provide verbal warnings of fire or an intrusion, O'Malley claimed.

System Configuration

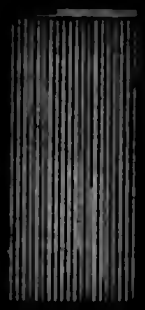
The system is based on an MC68000 microprocessor-based network consisting of five nodes, which are located in different parts of the house and tied together by an RS-422 communications link. Instead of performing different functions, each node controls a different section of the house and, in this way, minimizes the effects of hardware failure.

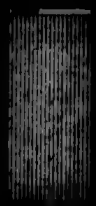
Most of the hardware is "off the shelf" and can be used with little or no modification, although the resulting system could not be installed in a house not already designed for it.

Intermodal communications are performed by an intelligent communications board that is supplied by an onboard MC6800 link processor. The host processor communicates with the link processor through 2K bytes of shared memory.

Both processors are always in operation, but are out of phase with each other to avoid contention in memory. Software development was carried out using MPL, an MC6800-oriented high-level language similar to PL/1 or Pascal.

The value of the hardware, software and time involved in system development amounted to approximately $100,000, according to a Motorola spokesman. The entire house is estimated to cost nearly $2 million.





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The Perkin-Elmer 3220.

A series of 58 benchmarks proves the Perkin-Elmer 3220 delivers 86% of the performance of a VAX 11/780.* For $83,000 less.

Perkin-Elmer offers a powerful alternative to the VAX 11/780—the Model 3220.

The chart tells the story. In the 58 benchmarks, the VAX 11/780 configuration costing $83,000 more outperformed the 3220 by only 14%. And there's more good news—you can get delivery on a 3220 in 60 days.

Of course, if you want a machine that outperforms the VAX 11/780 by a factor of 1.4 on these same customer-proven benchmarks, we've got the Perkin-Elmer Model 3240. And we'll save you money against the VAX price here, too.

The 3220 already has proven itself in a variety of demanding applications. In commercial, scientific, military/aerospace, and communications network installations, in seismic surveys and in off-track betting operations.

The 3220 gives you superior 32-bit hardware and software performance. It gives you instantaneous terminal response for transaction processing, and very high throughput for real-time system control. And it delivers exceptionally fast and accurate results required for scientific programs.

The 3220 comes with a choice of special software packages: Reliance for transaction processing and AD-2000** for CAD/CAM. Perkin-Elmer's industry-leading globally optimizing FORTRAN VII is available for real-time, event-driven applications.

Program development is fast and easy. With our Multi-Terminal Monitor you can have 64 programmers working simultaneously with COBOL, FORTRAN, CAL MACRO, or RPG II.

System integrity is fully safeguarded from media faults and failures. Scientific accuracy is assured with single- and double-precision floating point processing. And dynamic memory relocation and protect hardware safeguard time-critical, memory-resident programs for real-time applications.

For complete information on how to save $83,000 and get all the 32-bit power you need, call today or send in the coupon.

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PERKIN-ELMER

Expert Analyses, Statistics Combined

Global Crisis Forecasting Model Developed

By Bruce Hoard
CW Staff

PITTSBURGH, Pa. — Someday international crises may be analyzed, predicted — and avoided — through the use of a forecasting model developed here that combines expert analysis with statistical theory.

The model produces a 30-day forecast of the probability of rapid changes in a country's internal or external policies. It is based on the Markob theory of statistics.

The model was created by two academicians, Dr. George Duncan of Carnegie-Mellon University and Dr. Brian Job of the University of Minnesota. The expert analyses that fuel the model are drawn from a variety of sources, such as newspapers and magazines, but primarily from international experts in universities and the U.S. Departments of State and Defense, according to Job.

When a model is created for a certain world crisis situation, analysts are initially called upon to describe five possible levels — states ranging from moderate to extreme conditions — that the scenario may follow.

Two basic estimates are required of the analysts. First, they must estimate the likelihood of change from one level to all of the others and, secondly, the length of time those changes will take to occur. The estimates are known as transition possibilities and waiting time, respectively, Job said.

Problem With Quantity

Getting the transition possibilities and waiting time from the analysts is a delicate operation. According to Job, the trick is to get them to provide enough quantitative data to satisfy the model's statistical requirements.

Once obtained, the information is entered into one of the two computers being used in the project. The first is a Digital Equipment Corp. Decsystem-2060 at Carnegie-Mellon and the second is a DEC PDP-11/70 linked to Carnegie-Mellon over dial-up lines from Washington, D.C.

The resulting readout produces a set of forecasts on the likelihood of the scenario's being in each of the five possible states over each of the next 30 days.

Tested in Middle East

One area where the model has been tested is the Middle East. With tension between Isreal and its Arab neighbors always high, a crisis is never far away.

Duncan first applied the model to that international hotspot when the Israeli army sent troops into southern Lebanon last March 15. Analysts contributing their expertise viewed the incursion as a likely precursor to all-out war and rated it four on a scale of five.

After receiving that input, the two computers that run the model predicted a high probability that tension would remain at a very high level for several days.

Over the next two weeks, circumstances deteriorated to the point where the possibility of war was more likely than a continuance of present tensions or deescalation. The model reasoned thet the relationship among those three probabilities dictated some action in order to prevent full-scale war.

When the United Nations sent in peace-keeping troops, the model reflected a decrease in both the level of tension and the chances for war. Shortly after the arrival of the troops, the crisis subsided, bearing out the model's prediction.

Job was quick to point out that the model is not based on analyst unanimity. In the case of varying estimations, multiple forecasts are produced. The model may have to be radically altered in some cases.

As an example, he recalled the recent elections held in Zimbabwe Rhodesia, which the model has also been following.

For several weeks before the elections, tensions were high as campaigning was frequently marred by bombing and other acts of violence. After the elections, Prime Minister-elect Robert Mugabe took a reconciliatory stand toward the nation's white population and formed a broad-based government.

That change invalidated the estimations on which the model was built, and analysts expressed a desire to change transition possibilities, waiting time and the five possible states of the scenario.

Duncan built a safeguard into the programming that checks for analyst inconsistency. If an analyst says the chances of a transition's occurring from one state to another are four to one on one day and five to one the next, even though there has been no change in the situation, the computer will remind him of his inconsistency.

Duncan denied that the degree of efficiency achieved by the model is only negligently higher than that which could be realized through human intuition. "The value of the program is it can generate a large number of forecasts which are consistent with each other," he said. "It would be impossible for any person to do thet without a computer."

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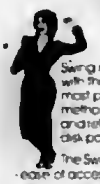

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Consumer Requests for No Junk Mail Backfire

WASHINGTON, D.C. — Simply asking to have one's name removed from junk mailing lists does not always work. At least two advertising companies have misused such requests from a trade organization, according to the "Privacy Journal," a monthly newsletter published here.

The Direct Mail/Marketing Association (DM/MA) offers a service to direct mail advertisers to beef up or purge their computerized mailing lists. The service consists of four sets of magnetic tapes distributed annually, although companies can opt for two a year.

One tape lists the people who want their names removed from any or all 24 categories of mailing lists. The other tape lists the people who want their names on any of the same lists. All the advertiser has to do is run the two tapes and its lists will be automatically updated, according to DM/MA spokesman Donna Sweeney.

There is a catch, however. In order to get off existing mailing lists, the consumer, by default, has to be put on another one — the DM/MA's list. That could result in the consumer's getting more junk mail than ever, the April edition of the "Privacy Journal" noted.

Two Cases

In one case, an advertiser inadvertently sent mailings to the people who asked not to receive them. In another case, the advertiser purposely sent mailings to consumers who did not want them to measure their response to more mail. The advertiser reported the response rate from that group was considerably less than normal.

The service applies only to consumers who are receiving junk mail at their homes. Business mailing lists are not included, Sweeney said.

If a consumer wants to get his name on or off a particular mailing list, he can contact DM/MA for a form. When the form is received, DM/MA enters the name on the appropriate tape, the spokesman said.

DM/MA can be reached at 6 E. 43 St., New York, N.Y. 10017. The "Privacy Journal" is published monthly from P.O. Box 8844, Washington, D.C. 20003.

Canadian Institute Seminars To Include Auditing and Controls

HOUSTON — A seminar on computer controls will be among three to be held this summer across the country by the Canadian Institute of Chartered Accountants (CICA).

"Computer Controls" was designed to teach participants how to evaluate internal controls in areas affected by DP. It will be held May 19-21 in Houston, June 2-4 in Chicago, Sept. 15-17 in Washington, D.C., and Oct. 6-8 in Phoenix.

"Computer Auditing" will explore the strategy and techniques an auditor should follow to carry out an effective audit. It will be held in Washington, D.C., on June 2-6, in Chicago on Sept. 22-26 and in Los Angeles Oct. 20-24.

"Successful Selection of Minicomputers" is aimed both at consultants and business executives faced with the problems of selecting the right equipment. It starts June 2-3 in Philadelphia, June 23-24 in Atlanta, Sept. 29-30 in Chicago and Oct. 20-21 in San Francisco, according to CICA.

Further information on the seminars is available from Stephanie Gaubatz, seminar coordinator, RHY Consultants, Inc., 1444 Balsam St., St. Paul, Minn. 55122.

Interface West Set for October

LOS ANGELES — More than 150 computer-related companies will exhibit their wares at the fourth annual Interface West conference and exposition for data communications and DP professionals here Oct. 28-30.

The two separate programs at the conference are "Office Automation and Small Business Procedures for Nontechnical Businessmen" and "Data Communications and Distributed Data Processing/Networking for Technically Oriented Managers."

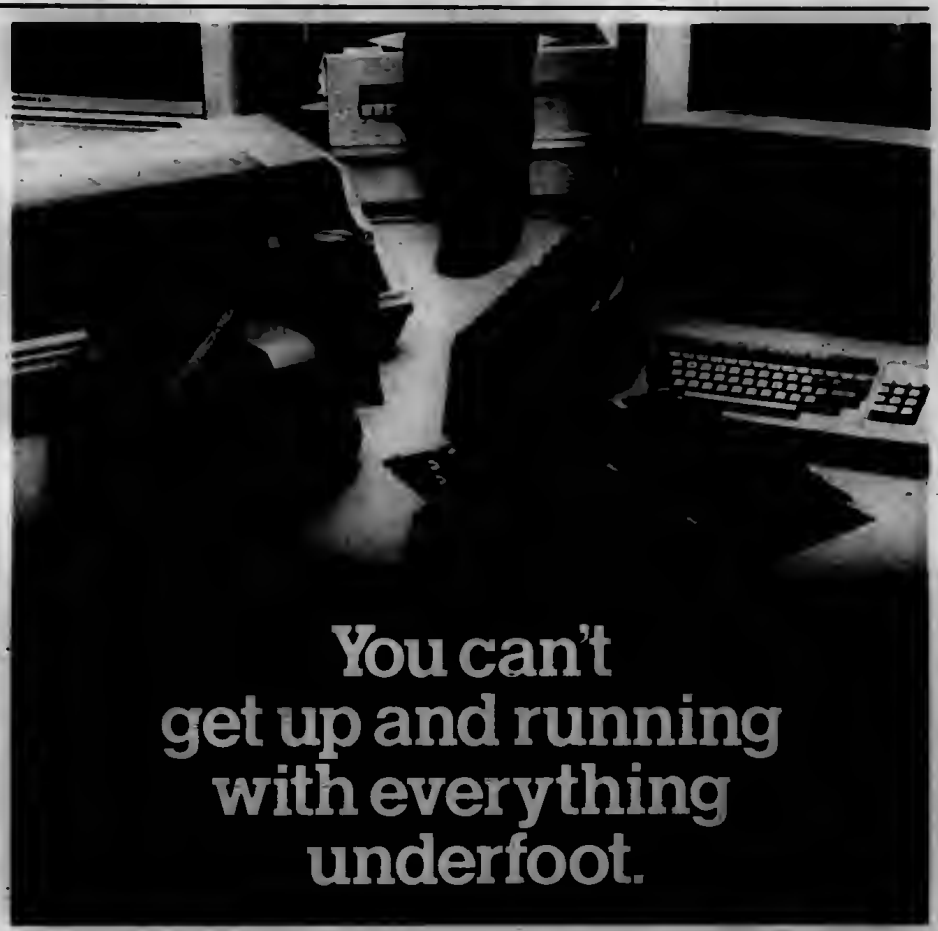
More than 100 industry experts will speak at the conference, The Interface Group said from 160 Speen St., Framingham, Mass. 01701.

Updated Poster Shows DP Tree

CHERRY HILL, N.J. — Management Information Corp. has introduced an updated version of its computer tree poster which depicts the evolution of DP systems from 1944 through the fall of 1979.

Measuring 18 in. by 24 in., the poster consists of a tree with each branch denoting a specific family of computer products according to the manufacturer and year of introduction. The poster was first introduced in 1976.

The updated computer tree poster costs $12 unframed or $60 framed from the vendor at 140 Barclay Center, Cherry Hill, N.J. 08034.



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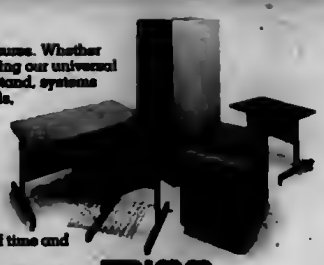

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Computer and peripheral desks, tables, vertical enclosures, printer stands, accessories.

Managers on the Move

FRANK J. BURRIDGE has been appointed corporate manager of data processing at Berol Corp. in Danbury, Conn. His responsibilities will include the development and maintenance of long-range DP plans, the DP audit function and the provision of consultant services where required.

Burridge headed his own consulting company in Italy before coming to the U.S. in early 1975, when he joined Boehringer Ingleheim Ltd. as manager of systems development.

He holds degree in industrial engineering and business administration from the UK and is an active member of the Institute of Administrative Management in Europe.

• • •

Frank J. Burridge

Fred Garbotz

ALAN B. WOLFSON has been promoted to manager of data base support in the Corporate Information Systems Planning Department at R.J. Reynolds Industries, Inc. in Winston-Salem, N.C.

Wolfson joined R.J. Reynolds in 1977. Prior to his promotion, he was a senior data base analyst.

He graduated from Rutgers University with a bachelor of arts degree in mathematics.

• • •

FRED GARBOTZ has been appointed director of administrative services for Business Incentives, Inc. of Minneapolis.

Garbotz was manager of client systems with Maritz, Inc. of St. Louis for eight years. He also spent three years as assistant director of DP for the E.F. MacDonald Co. of Dayton, Ohio.

• • •

MICHAEL T. ROACH has been appointed assistant vice-president at E.F. Hutton & Co., Inc. in New York.

Roach joined E.F. Hutton last July as a DP audit supervisor. Prior to that, he held a similar position with another brokerage firm.

He is pursuing a degree in accounting and business administration at the New York Institute of Technology.

• • •

JAMES L. PIERCE has joined ARA Services, Inc. as a corporate vice-president and director of the service management company's management information systems (MIS) organization.

Prior to joining ARA, Pierce was director of management information for Walgreen Co., Inc. of Chicago. He also served as DP director for L.S. Ayers and Co. in Indianapolis and for General Motors' Guide Lamp Division.

Pierce is a 1958 graduate of Ball State University.

• • •

Bethlehem Steel Corporation has named JAMES J. DARCY network manager, WILLIAM S. LAUDIS computer operations manager and ROBERT A. LAWHORN technical support manager in the accounting department's Home Office Information Services Division.

Darcy was supervisor of data entry and control in Bethlehem. He joined the company in 1970 as a member of the Loop management training program after receiving a B.S. degree in accounting from Tri-State University. He has also worked as a programmer, then was named associate systems engineer.

Landis joined the corporation in 1939 in the accounting department's Billing Division, advancing through several positions to section head in 1965. He was named operations systems supervisor in 1968. The following year he was named assistant manager of computer operations and corporate data processing.

Lawthorn, joined the firm in 1967 after receiving a B.A. in mathematics from Lycoming College. He worked in the accounting department and in 1970 was promoted to systems analyst. In 1973 he was promoted to supervisor, systems and programming, and in 1976 was named supervisor of software planning and support technology.

He has completed some graduate work at Lehigh University and is a

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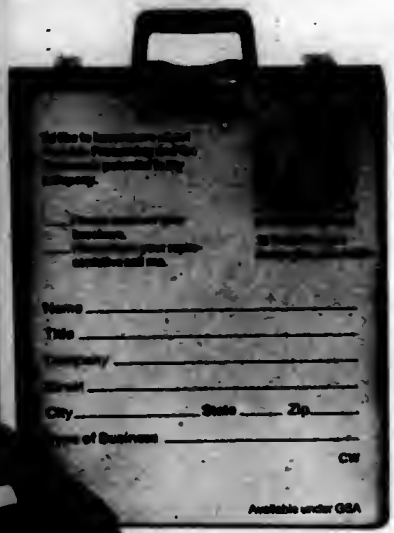

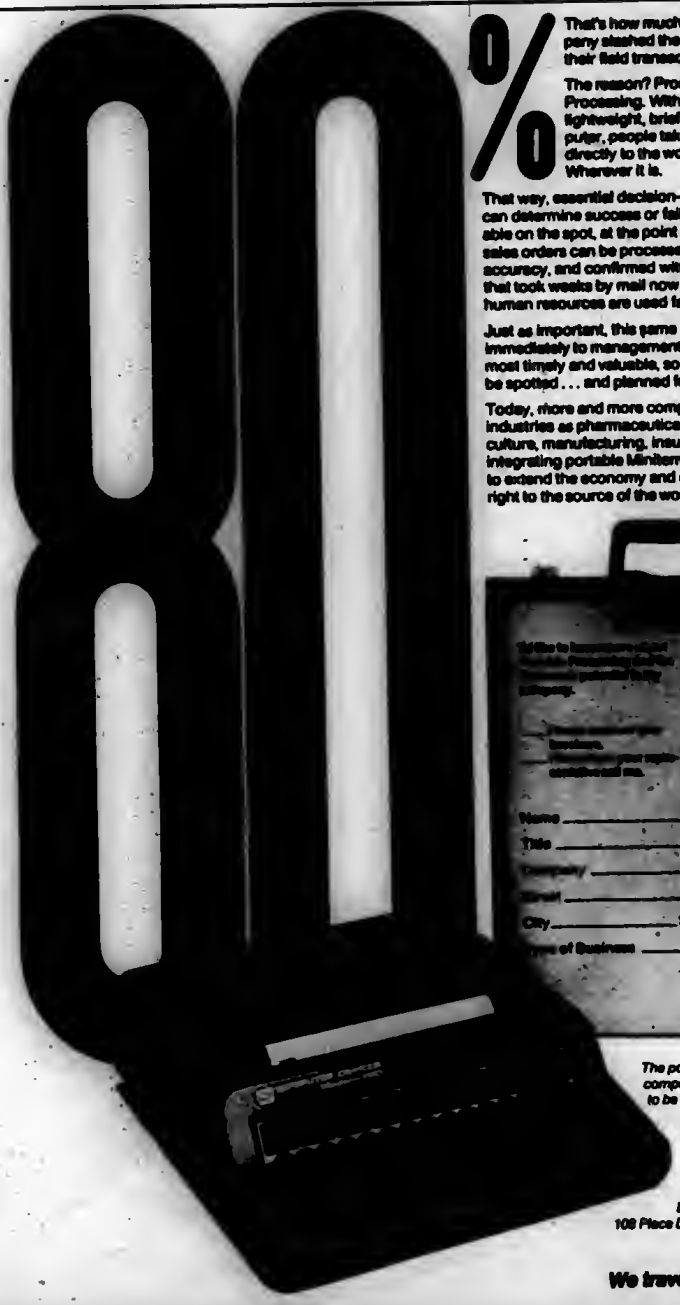

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member of the evening session faculty at Moravian College.

• • •

JAMES STERLACE has been appointed program manager of operations for Computer Consoles, Inc. in Rochester, N.Y. He will be responsible for planning, coordination and control of selected product development projects within the engineering and manufacturing area.

Prior to joining Computer Consoles, he was program manager for large and central process control system development at Taylor Instruments Co. He also held a number of engineering management positions at Stromberg-Carlson Corp.

• • •

RICHARD W. YENNERELL has been named director of management information services of CF&I Steel Corp. in Pueblo, Colo. Yennerell will be responsible for all computerized activities within the corporation, including information systems and process control applications with the mill operation.

Yennerell joined CF&I in 1975 as manager of cost accounting. In 1976 he was promoted to director of financial services and in 1978 was appointed chairman of the Computer Task Force.

Yennerell holds a B.S. degree in accounting from Saint Vincent College.

• • •

ROBERT J. LAUER has been promoted to DP director at Bunker Ramo Corp. in Westlake Village, Calif.

Lauer joined Bunker Ramo in 1968 as a senior programmer/analyst and was promoted to programming supervisor. He was subsequently promoted to manager of DP in 1972.

Prior to joining Bunker Ramo, he was employed by Lightcraft Corp. as a senior analyst.

• • •

DOREEN BARTON has been named assistant vice-president for systems and programming at Benefit Trust Life Insurance Co. in Chicago.

Barton was director of application systems before her promotion. Prior to that, she served as systems designer, senior program analyst, programmer analyst and programmer.

She joined Benefit Trust Life in 1971.

• • •

WALTER B. WILLIAMS has been appointed vice-president of management information services at ILC Data Device Corp. in Bohemia, N.Y. Williams will direct data center operations in all activities related to information resource management, business systems and procedures, data administration and programming.

Richard W. Yennerell

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When Should Contractors Be Used?

Q As a matter of policy, our company gives new systems development work to contractors even though we have 20 computer specialists on the permanent staff. Our in-house staff involvement is limited to maintenance of contractor-developed systems. We probably spend more time revising these systems than it would have taken to do the development ourselves.

By the time we determine that a system is not at all what we wanted, the people who developed it are no longer available.

Our users associate all this bad work with the permanent staff, so we bear the brunt of just about everybody's hostilities.

A When a DP staff exists, I would never recommend that an outside contractor be given sole responsibility for an application system. If for no other reason, the effects of the "not-invented-here" syndrome will significantly reduce the probability of success.

Your staff should be given the opportunity to develop functional area and technical expertise as part of your career development program. At present, this expertise is being developed by contractors.

When a DP staff exists, contractors should be used primarily for work load leveling. Even then, contractors should be integrated with existing in-house project teams. In this way, their departure does not have such a catastrophic effect on maintenance, and in-house personnel can develop the expertise necessary to be more responsive to dynamic user requirements.

It appears that user requirements were not clearly defined and communicated to your contractors. A "sign-off" on specifications should be standard operational procedure in any organization.

Q Next month I'll be moving to another state. Although I have only 10 months' DP experience, I had no trouble obtaining two good job offers.

One offer is from a small company with a DP staff of only four. The other is from a larger company with a staff of more than 250 in its management information services division.

I would prefer working in a small company. The large company, however, offers a significantly higher salary and job security. When salary and future promotions are considered, I tend to lean toward the large company. Am I leaning in the right direction?

A Opportunities exist in both large and small DP environments, but these opportunities, as well as the learning experiences, are quite different.

In general, the staff of a small computer center depends on breadth of knowledge for survival. The breadth of knowledge gained by working in a small company may offset the lower salary. In two years a rookie like yourself will be exposed to everything from data entry to project management, an exposure that would take much longer to get in a large computer center.

Except for small companies experiencing rapid growth, larger companies probably do offer more internal advancement opportunities for DP professionals. That means you probably will be promoted more often — analyst, team leader and so on.

I'm not a proponent of one or the other, but would like to make an observation: young people entering the DP career field tend to underestimate the value of the broad range of experiences afforded by a small center.

Q The scope of services we can offer with our present computer configuration is limited. With a larger processor and significantly greater storage capacity, we feel we can save the company money by updating and upgrading our service potential.

We are preparing to recommend a $500,000 hardware upgrade to management. Any ideas on justification?

A First of all, I don't agree with your approach to hardware acquisition. You don't purchase the hardware and then develop systems to fit the hardware. The catalyst for hardware planning should be a comprehensive application systems plan, not the other way around.

The fundamental justification for hardware acquisition is the implementation of more effective and responsive information systems; therefore, I would recommend that you concentrate your efforts on the compilation of an application systems plan. Justify the necessary commitment of resources, then select the hardware to meet those needs.

Have a question? Send it to Larry Long, Editorial Department, Computerworld, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

Long is a professor at Lehigh University, a DP consultant and author.

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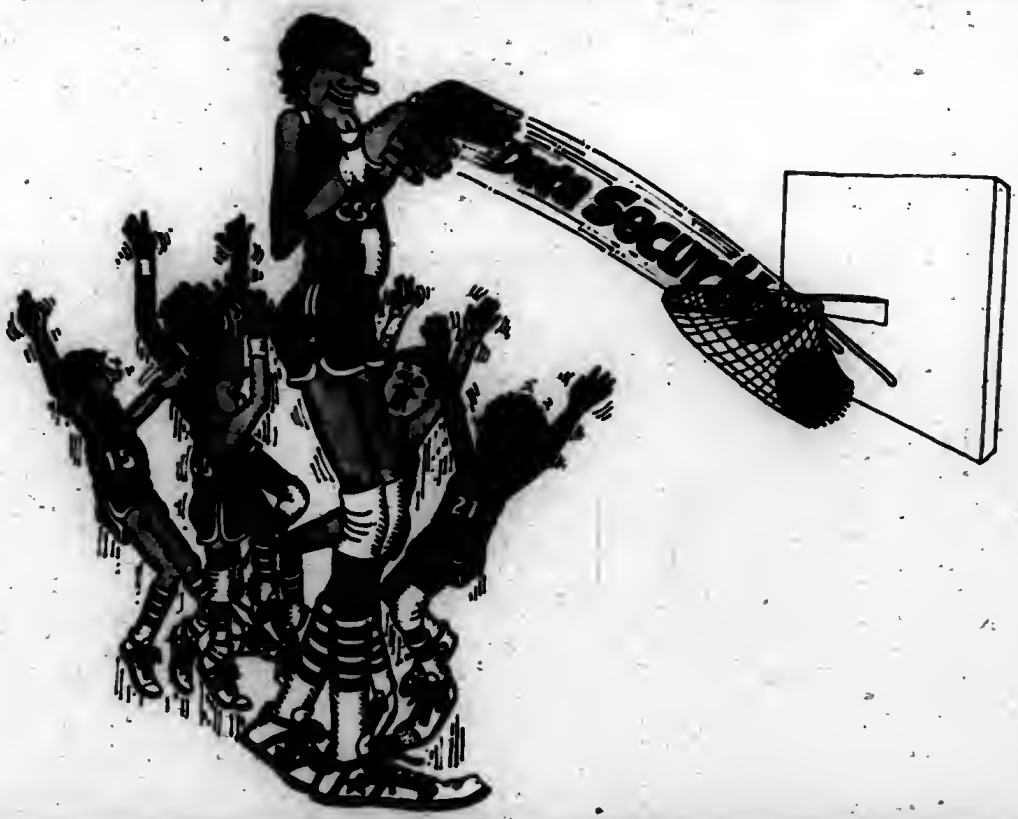

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June 8-11, Seattle — International Conference on Communications. Contact: Institute of Electrical and Electronic Engineers, 345 E. 47 St., New York, N.Y. 10017.

June 8-13, Pocono Manor, Pa. — Material Handling Management. Contact: American Institute of Industrial Engineers, 25 Technology Park/-Atlanta, Norcross, Ga. 30092.

June 9-10, Washington, D.C. — How to Develop a Users Systems Plan. Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20014. Also being held June 11-13 in Washington, D.C.

June 9-10, Boston — Distributed Data Base: Design, Operations and Communications, sponsored by *Data Communications* magazine. Contact: McGraw-Hill Expo Center, Room 3677, 1221 Ave. of the Americas, New York, N.Y. 10020.

June 9-11, Boston — Computer Security Conference. Contact: American Society for Industrial Security, Suite 651, 2000 K St., N.W., Washington, D.C. 20006.

June 9-11, San Francisco — Effective Computer Operations Management. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 18-19 in New York and June 23-25 in Chicago.

June 9-11, San Francisco — Data Base Management Systems for Minis: a Comparative Analysis. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 18-20 in New York.

June 9-11, New York — Financial Information Systems, sponsored by American Institute of Industrial Engineers, P.O. Box 3727, Santa Monica, Calif. 90403.

June 9-11, New York — Professional Development Seminar, sponsored by American Computing Machinery. Contact: United Engineering Center, 345 E. 47 St., New York, N.Y. 10017

June 9-11, Boston — A Practical Approach to Data Processing for the Non-DP Executive. Contact: Institute for Science and Public Relations, 1370 Ave. of the Americas, New York, N.Y. 10019. Also being held June 25-27 in Chicago.

June 9-11, San Francisco — Office Automation Systems. Contact: Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

June 9-11, Chicago — IMS Message Format Service. Contact: Data Base Management, Inc., 281 Hartford Tnpk., Vernon, Conn. 06066.

June 9-11, Washington, D.C. — Tuning-Up the Corporate EDP Function: A Management Primer for the '80s. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 9-11, Los Angeles — EDP Operations Today: Effective Scheduling and Console Operation. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 18-20 in Chicago.

June 9-12, Dallas — Negotiating Skills. Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

June 9-12, Washington, D.C. — Software Acquisition/Development Management. Contact: Software Enterprises Corp., 2239 Towngate Road, Westlake Village, Calif. 91361.

June 9-12, Las Vegas — CICS/VS Application Design. Contact: On-Line Software International, 65 Rt. 4 E. River Edge, N.J. 07661.

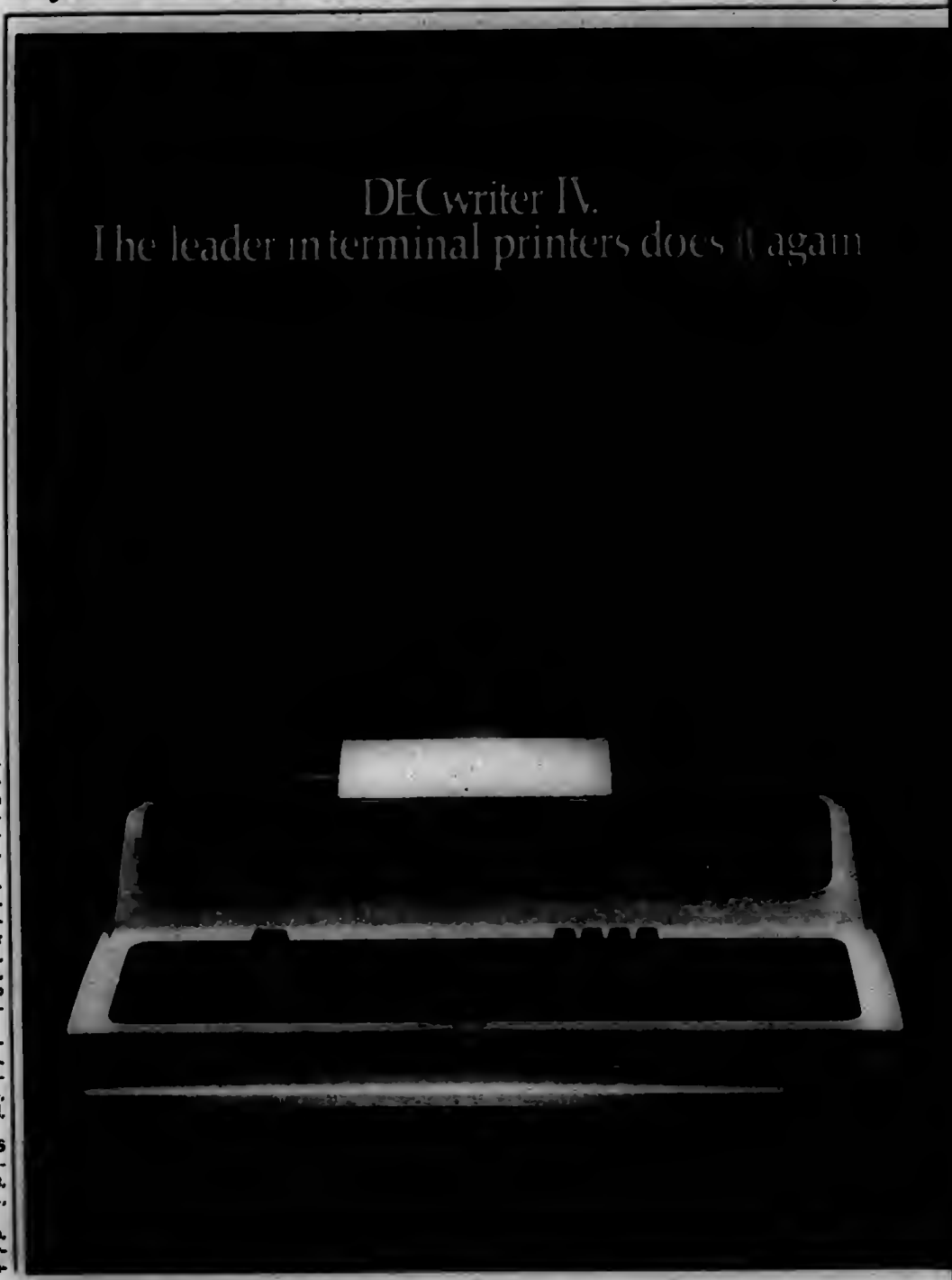
June 9-13, Short Hills, N.J. — Structured Design and Programming. Contact: Brandon Consultant Group, 1775 Broadway, New York, N.Y. 10019.

June 9-13, Hilton Head, S.C. — Management of DP Productivity. Contact: Systems Management Associates, 21 Linden Ave., Lynbrook, N.Y. 11563.

June 9-13, Wichita, Kan. — Train the Trainers. Contact: Langston, Kitch & Associates, Inc., 715 E. 8 St., Topeka, Kan. 66607.

June 9-13, New York — Computer Contract Negotiation. Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20014.

June 9-13, Jackson Hole, Wyo. — Personnel Productivity in Data Processing. Contact: Kesten Associates, 11317 Old Club Road, Rockville,



Calendar

Md. 20852.

June 9-13, Summit, N.J. — Structured Design and Programming. Contact: Chubb Institute for Computer Technology, 480 Morris Ave., Summit, N.J. 07901.

June 10-11, New York — Electronic Mail Systems in the '80s. Contact: Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.

June 10-12, Los Angeles — Communications Protocols and Computer Networking. Contact: Computer Technology Institute, Suite 101, 1024 Pico Blvd., Santa Monica, Calif. 90405.

June 10-12, Bossier City, La. — Data Processing Management Association Region Three Meeting. Contact: Frank Thaxton, Blaylock Investment Corp., P.O. Box 31733, Shreveport, La. 71130.

June 10-12, Minneapolis — DP Long-Range Strategic Plan Workshop. Contact: Management Dimensions, 185 E. Garfield Ave., Pomona, Calif. 91767.

June 10-13, Washington, D.C. — Pascal Computer Programming. Contact: George Washington University, Continuing Engineering Education, Washington, D.C. 20052.

June 11-12, Frankfort, Germany — IBM MVS. Contact: Online Conferences Ltd., Cleveland Road, Uxbridge, England UB8 2DD.

June 11-13, Halifax, N.S. — Changing Tides, sponsored by Data Processing Management Association of Canada. Contact: Donald Stewart, Maritime Computers Ltd., 3767 Howe Ave., Halifax, N.S., Canada B3L 4H9.

June 11-13, San Francisco — DP Disaster Recovery Workshop. Contact: EDP Security, Inc., 400-2 Totten Pond Road Waltham, Mass. 02154.

June 11-13, Stamford, Conn. — Writing Improvement Methods. Contact: Management Resources International, Inc., 6621 Electronic Drive, Springfield, Va. 22151. Also being held June 23-25 in Washington, D.C.

June 11-13, New York — Word Processing Supervision Workshop. Contact: National Institute for Management Research, P.O. Box 3727, Santa Monica, Calif. 90403.

June 11-14, Tampa, Fla. — Data Processing Management Association Region Seven Conference. Contact: Chris Meyer, BST Data Systems, Inc., P.O. Box 22435, Tampa, Fla. 33623.

June 12, Chicago — IMS Dump Readings. Contact: Data Base Management, Inc., 281 Hartford Tnpk., Vernon, Conn. 06066.

June 12-13, Santa Clara, Calif. — Structuring/Negotiating Computer and Data Processing Contracts. Contact: Law Journal Seminars-Press 233 Broadway, New York, N.Y. 10007.

June 15-18, Maratea, Italy — Multiple-Processor Computers, sponsored by North Atlantic Treaty Organization Scientific Affairs. Contact: Scion Consultancy International Ltd., Sanderson House, 49-57 Berners St., London, England, W1P 4AQ.

June 16-18, San Francisco — Minicomputer Systems: Guidelines for Successful Selection, Acquisition and Operation. Contact; Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 16-18, Madrid — Data Bases in the Humanities and Social Sciences, sponsored by Universidad Complutense. Contact: Sr. E. Garcia, Facultad de Informatica, Carretera de Valencia, Madrid 31,

(Continued on Page 60)

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Calendar

(Continued from Page 59)
Spain.

June 16-18, San Francisco — Distributed Systems: Effective Approaches and Applications. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 16-18, New York — Computer Contracting. Contact: International Computer Negotiations, Inc., 1331 Palmetto Ave. Winter Park, Fla. 32789.

June 16-18, Pittsburgh, Pa. — Computer Security. Contact: Data Processing Security, Inc., 200 E. Loop 820, Fort Worth, Texas 76112.

June 16-18, Teaneck, N.J. — On-Line Systems Design. Contact: Q.E.D. Information Sciences, Inc., 141 Linden St., P.O. Box 181, Wellesley, Mass. 02181.

June 16-19, Washington, D.C. — Software Configuration Management. Contact: Software Enterprises Corp., 2239 Towngate Road, Westlake Village, Calif. 91361.

June 16-20, New York — CICS/VS Application Programming. Contact: On-Line Software International, 65 Rt. 4 E. River Edge, N.J. 07661.

June 16-20, Kansas City, Kan. — Systems Analysis Workshop. Contact: Brandon Systems Institute, Inc., 4700 Montgomery Lane, Bethesda, Md. 20014.

June 16-20, Washington, D.C. — Achieving Effective Project Management. Contact: Atlantic Software, Inc., 910 Lafayette Building, 5 and Chestnut St., Philadelphia, Pa., 19106.

June 16-20, Denver — How to Develop an Effective Long-Range Data Processing Plan. Contact: Keston Associates, 11317 Old Club Road, Rockville, Md. 20852.

June 17-19, Cincinnati — Expo 80. Contact: The Conference Co., 60 Austin St., Newton, Mass. 02160.

June 17-19, Washington, D.C. — Auditing, Security and Controls. Contact: Advanced Computer Techniques Corp., 222 N. Central Ave., Phoenix, Ariz. 85004.

June 17-19, Washington, D.C. — DP for Managers and Professionals. Contact: Management Resources International, 6621 Electronic Drive, Springfield, Va. 22151.

June 17-20, Los Angeles — Data Base Management Systems. Contact: Computer Technology Institute, Suite 101, 1024 Pico Blvd., Santa Monica, Calif. 90405.

June 18-19, Topeka, Kan. — Structured Documentation. Contact: Langston, Kitch & Associates, Inc., 715 E. 8, Topeka, Kan. 66607.

June 18-19, London — Business Telecommunications. Contact: Online Conferences Ltd., Cleveland Road, Uxbridge, England UB8 2DD.

June 18-19, London — Satellite Communications. Contact: Online Conferences Ltd., Cleveland Road, Uxbridge, England UB8 2DD.

June 18-20, New York — Computers in Manufacturing. Contact: American Institute of Industrial Engineers, P.O. Box 3727, Santa Monica, Calif. 90403.

June 18-20, Rio de Janeiro, Brazil — Minicomputers for Commercial Data Processing. Contact: Compucenter do Brasil Ltda., Caixa Postal 51674, 01000 Sao Paulo SP, Brazil.

June 18-20, Cambridge, Mass. — Word Processing: Concepts and Guidelines. Contact: Harvard University, Lab for Computer Graphics, 48 Quincy St., Cambridge, Mass. 02138.

June 18-20, New York — Integrated Project Management. Contact: On-Line Systems, Inc., 40 Washington St., Wellesley, Mass. 02181.

June 18-21, Philadelphia — Meeting of Computing Linguistics, sponsored by Association of Computational Linguistics and SRI International, Inc. Contact: SRI International, Inc., 333 Ravenswood Ave. Menlo Park, Calif. 94025.

June 18-23, Oak Brook, Ill. — Education Coordinators' Workshop. Contact: Deltak, Inc., 1220 Kensington Road, Oak Brook, Ill. 60521.

June 19, Gaithersburg, Md. — Pathways to System Integrity, sponsored by Association for Computing Machinery and the National Bureau of Standards. Contact: Charles Youman, 4419 N. 18 St., Arlington, Va. 22207.

June 23-24, Stamford, Conn. — Data Processing for Secretaries and Administrative Sup-

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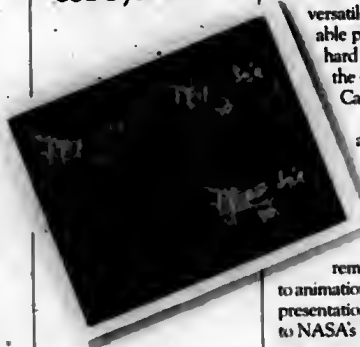

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port Personnel. Contact: Management Resources International, Inc. 6621 Electronic Drive, Springfield, Va. 22151.

June 23-25, Minneapolis — Design Automation Conference, sponsored by Institute of Electrical and Electronic Engineers and American Computing Machinery. Contact: Mr. E.B. Hassler, Texas Instruments, Inc., P.O. Box 225621, M.S. 3907, Dallas, Texas 75265.

June 23-25, Chicago — Microfilm in Records Management. Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

June 23-25, Norfolk, Va. — National Educational Computer Conference, sponsored by Association for Computing Machinery, Association for Educational Data Systems, American Federation of Information Processing Societies, American Society for Engineering Education, Society of Computer Simulation, Inc. and Institute of Electrical and Electronic Engineers. Contact: Gerald L. Engel. Computer Science Department, Christopher Newport College, Newport News, Va. 23606.

June 23-25, San Francisco — World Computing Services Industry Congress. Contact: Association of Data Processing Service Organizations. 1925 N. Lynn St., Arlington, Va. 22209.

June 23-25, Washington, D.C. — Federal ADP Systems Update. Contact: American Institute of Industrial Engineers, P.O. Box 3727, Santa Monica, Calif. 90403.

June 23-25, New York — Data Base Management Systems for Minis: A Comparative Analysis. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 23-25, Washington, D.C. — Error Correcting and Detecting Codes. Contact: Hellman Associates, 299 S. California Ave., Palo Alto, Calif. 94306.

June 23-27, Rome — Transborder Data Flow Policies. Contact: Intergovernmental Bureau for Informatics, Viale Civilta del Lavoro 23, POB 10253, Rome 00144, Italy.

June 23-27, Toulouse, France — Large-Scale Systems: Theory and Applications, sponsored by International Federation of Automatic Control. Contact: Association Francaise Pour la Cybernetique, Economique et Technique, 156 Blvd. Pereire, 75016 Paris, France.

June 23-27, Detroit — Design Techniques Workshop. Contact: Pan-Core Consultants, Inc., Suite 200, 2 Northfield Plaza, 5700 Crooks Road, Troy Mich. 48098.

June 24-25, New York — Information Network Security, sponsored by *DataCommunications* magazine. Contact: McGraw-Hill Expo Center, Room 3677, 1221 Ave. of the Americas, New York, N.Y. 10020.

June 25, — Computer Graphics for Business Charting and Mapping. Contact: AUI Data Graphics, 1701 K St. N.W., Washington, D.C. 20006.

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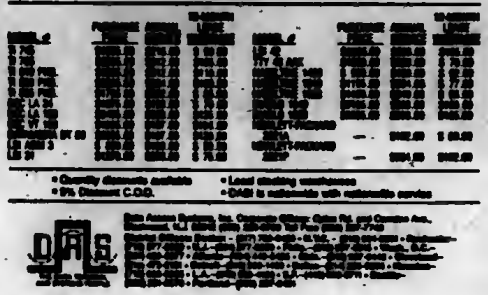

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EDITORIAL

The Voice of the User

This week we are presenting the latest user ratings of computer systems, based on a survey developed and written by Datapro Research Corp.

We will have to admit that we are biased; we supplied our mailing list to Datapro for this research project. However, this is certainly the best effort that firm has made to date.

Out of almost 15,000 users surveyed, 35% took the time to answer 87 separate questions about the systems they have installed. And the voice of the user should be the name of the game in this business.

In all, those users rated about 3,885 major mainframe systems, about 3,437 minicomputer systems and about 549 microcomputer systems.

The results were analyzed by the researchers at Datapro and are presented here for you to analyze and massage any way you want. We will be using the results as the basis for several stories in the future.

But let's look at the criticisms before we spend too much time patting Datapro on the back. In the past, many have criticized Datapro studies because of a low return rate. However, the 35% return in this case should set that concern to rest.

Another criticism is that the study might not be completely valid for the population of equipment actually in the field. This criticism holds some weight, since this audience was clearly not scientifically selected.

Moreover, although two mailings were used in this study, there was no follow-up telephone work to determine if nonrespondents have reactions different from those of respondents to the mail survey.

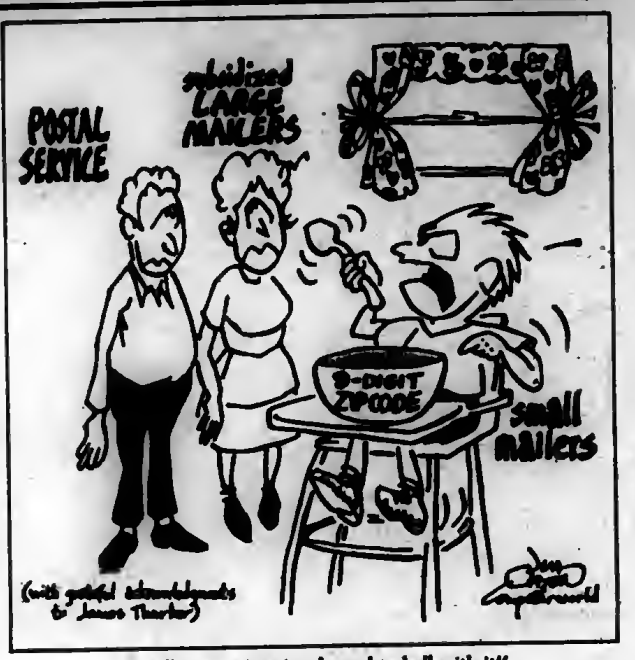
This lack of statistical precision will bother the most fussy of statisticians; however, we feel that they would be quibbling about small points rather than looking at the broad picture.

The Datapro studies are the *only* attempt in the industry at this time to measure — independently and objectively — how users acutally feel about their equipment and to define what they are doing with it.

As such, the Datapro editorial department deserves a great deal of praise. Anyone can find out what a manufacturer thinks about its equipment — naturally it feels that its equipment is the best thing since sliced bread. And any manufacturer can give out lists of happy clients.

Only Datapro, however, makes the effort to find out what a broad cross-section of users feels about the equipment —, and that overall feeling is important to other users looking at similar equipment.

We are proud to have been part of this Datapro study and congratulate that firm for a project well done. We hope that the ratings — which are derived from what real users say about the products — will help other users in their decision-making processes.



'Well, I say it's spinach, and to hell with it!'

DATA PAST

Five Years Ago
May 21, 1975

NEW YORK — After six years of preparation and a slew of delays, the U.S. vs. IBM antitrust case went to trial here this week. The trial was expected to last about a year with a two-month recess during the summer. In its filing, the government accused IBM of monopolizing the general-purpose computer market through a series of practices designed to maintain a high share of the market and to keep competition at a minimum.

— — —

ANAHEIM, Calif. — Two speakers at the National Computer Conference which opened here this week predicted that past technological accomplishments rather than future breakthroughs will eventually bring computer costs for the terminal user somewhere in the range of telephone service. The speakers were IBM's Bernard J. Greenblott and Mu Y. Haiao.

Eight Years Ago
May 17, 1972

ST. PAUL, Minn. — A federal court here ordered IBM and Control Data Corp. to have their antitrust case ready for trial within a year. Judge Philip Neville ordered the two companies to "agree on the remaining discovery and deposition schedules."

LETTERS

Cobol Issues

This letter is in reply to two topics from *Computerworld*. In the March 31 issue, Robert Higgins asked if anyone had implemented indexes as two registers. The Control Data Corp. Cyber 170 Cobol 5 compiler has an implementation similar to the desired one.

The index which is associated with an index-name is contained in one word, with the upper half containing the occurrance number and the lower half the calculated subscript. This does not add any extra instructions to a SET UP BY or DOWN BY instruction or to a SET index-name to literal instruction. It does add a couple of extra register operations to SET TO identifier, however, but the overhead is negligible. The knowledgeable programmer knows this and uses index-names as often as possible. I doubt if any of them feel "a twinge of discomfort" unless they avoid using index-names.

The other topic is Clyde Miller's commentary "Structured Programming in Cobol Needs Help" [CW, April 14]. This type of comment causes me some discomfort, since the Codasyl Cobol Committee added "structured programming" facilities to the language several years ago. Apparently, the word is not out. The next Ansi standard (expected next year) will contain these features. The format of these features has been published in CW as well as in articles in *Datamation*.

In Miller's example, take out the DO: change the code a bit and the new language accomplishes the same task. For example:

```
COMPUTE BALANCE = 1.00 - PURCHASE.
PERFORM UNTIL BALANCE NOT LESS
THAN 0.25
    COMPUTE QUARTERS = QUARTERS + 1
    COMPUTE BALANCE = BALANCE - 0.25
END-PERFORM.
```

etc.

Note that this uses the familiar PERFORM verb and reads much better than the WHILE ... DO (that is, it reads better to a Cobol programmer, maybe not to an Algol programmer). Some currently available compilers have this construct (the CDC one mentioned above, for example), so it would pay a programmer to learn how to use them. I expect that almost all compilers will have the "structured programming" facilities in a couple years.

I would hope that in the future, people who write letters or articles for CW would familiarize themselves with the work of the Codasyl Cobol Committee and Ansi X3J4 before damning Cobol.

If someones wants to change the language, they should write to the Codasyl Cobol Committee, not CW. The address is: Chairman, Cobol Committee, Codasyl, P.O. Box 1808, Washington, D.C. 20013.

Also, it is possible to subscribe to the Codasyl newsletter, which lets readers know what the various Codasyl committees are doing. For a quick update on what has happened to Cobol in the last six years, write to me at the above address and I will send you a synopsis of the Cobol Committee activities.

I hope that this plea will result in a more informed populace as well as more participation in and awareness of our activities.

Donald F. Nelson
Chairman

Codasyl Cobol Committee
Washington, D.C.

ACU Efforts

I have just run across your articles on the benchmark studies by the Association of Computer Users (ACU) and would like to congratulate you on carrying them. I think the ACU effort is one of the most needed undertakings of the field and am delighted to see it getting some attention.

Samuel A. Scharff

Englewood, N.J.

READER COMMENTARY — C.N. Winningstad

Instruction, Operation: A Confusion in Terms

Floating Point Systems, Inc. (FPS) has noted recently, in computer usage, a tendency to utilize the term "instruction," and its derivatives, such as Mips (millions of instructions per second), in a way which is inconsistent with the Institute of Electrical and Electronics Engineers (IEEE) Standard 100-1977 and other authoritative sources. This misuse appears to derive from a tendency to use the term, as it applies to simple serial machines, in a parallel-type machine case.

For example, Dean Witter Reynolds, Inc., in its "Technology Glossary," published in April, defines an "instruction" as an elementary operation of a computer . . . " This comes about by mapping the "instruction set" for a minicomputer one-to-one on the resulting operation and leads to a tendency to use "instruction" and "operation" interchangeably. FPS believes there is an important distinction and that we should try to adhere to the IEEE definitions.

According to IEEE, an instruction is the information conveyed to a computer, which will cause one or more operations to occur (it may include addresses for further information to accomplish the operations). Since the simple statement "The AP-120/190 array processor has a capability of 6 Mips" badly understates the AP-120/190 in terms of a minicomputer (of the conventional variety) with the same number of Mips, one can sympathize with IBM (who prefers to talk about "throughput," rather than a few performance parameters, any one of which may be exceeded by the competition).

Based upon the IEEE definitions, our instruction word, occurring at a 6-MHz rate, entitles FPS, without much doubt, to state a 6 Mips rating. But each instruction word can cause 10 or more distinct operations (floating-point add, floating-point multiply, integer calculation, main data fetch, table memory fetch, branch decision, two register reads, two register writes, plus other data transfers), on the same machine cycle. Hence we have the capability of 60 Mops (millions of operations per second), which far exceeds minicomputer (and some mainframe) capability.

If one speaks of floating-point operations only, then the AP-120/190 is capable of 12M Flops (floating-point operations per second).

FPS notes Dean Witter Reynolds, Inc. is not alone in this problem. Several industry think tanks have published charts in *Computerworld*, and elsewhere, providing performance measures, wherein Mips and Mops are used with apparent interchangeability — and with no convenient way to know whether they're talking IEEE Mips, Mops or what.

FPS can sympathize with IBM especially, since for certain problems (such as sparse matrix inversion) FPS' architecture is very efficient. Some machines are capable of a theoretically high Mops rate, but in fact cannot take advantage of the number because of a "scarce resource" such as data paths. Many a machine claims a high megaflop capability, but it can only be

(Continued on Page 70)

SOCIOLOGY OF COMPUTING/Robert L. Glass

Sometimes Quality Is Only Skin Deep

Once upon a time there was a very proud software manager.

The manager was in charge of a software project that was looked upon in his company as a model for How To Build Software.

The project was, to be brief, Under Budget and On Schedule.

And in the halls of management, where accolades are passed out for performance on the project, there is no finer thing to be than Under Budget and On Schedule.

Once upon a time, there was a very proud quality assurance manager.

The manager was in charge of quality assurance for the software on the Under Budget and On Schedule project.

The project was, to be brief, configuration-managed and standards-conforming to a fare-thee-well.

And in the halls of quality, when the subject of quality itself arises, it is generally agreed that configuration and standards are What It Is All About.

Once upon a time, there was a customer. The customer was very sad. The software product the customer received was a pile of excrement.

The software was produced well under budget. And on schedule. It was impeccably configuration-managed. And standards-conforming.

But it did not do what the customer wanted. It did not fit in the customer's computer's memory. It did not operate as fast as the customer wanted. It was abysmally difficult to modify, so that the customer could not even change it to be what was wanted. And when it did operate, it failed more often than it worked.

Once upon a time, there was a corporate president.

The corporate president was in charge of the manager who was Under Budget and On Schedule. The corporate president was in charge of the quality assurance manager who managed configurations and audited standards.

But the corporate president was not in charge of everyone. There was, for example, the customer.

When the customer spoke to the corporate president, he spoke of value received. He spoke of usability, efficiency; maintainability and reliability. In brief, he spoke of Quality. And he was upset. The corporate president listened.

Then the corporate president spoke to his two managers. "What went wrong here?" he said.

"I was under budget and on schedule," the software manager said.

"I achieved configuration management and standards conformance," the quality assurance manager said.

"But who is looking out for product quality?" the exasperated corporate president cried.

No one answered.

THE TAYLOR REPORT/Alan Taylor

Faulty IBM Cobol Evading U.S. Tests

On April 25, IBM started distributing a Cobol which, the company claimed, was in conformity with U.S. government standards; however, IBM had not obtained a certificate from the government compiler testing service. In fact, IBM knew that this particular Cobol had serious problems, and they are actually being deliberately evaded during customer training. This Cobol almost certainly does not conform to even the letter of the standard, and certainly does not conform to its spirit!

The problems arise primarily from a 1979 General Systems Division (GSD) decision to use a noncommercial operating system as a base for a Cobol compiler — and from the subsequent failure of IBM's quality assurance operations to catch the resulting problems before the product was marketed and orders taken. In fact, when it is used as described in the IBM manual, the compiler can result in printed output from different programs being mixed up; and the preprinted stock on which invoices, payslips and so forth are printed is made useless by unexpected line feeds that put the paper and the printing out of sync.

Clearly such problems are sufficient to make the truthfulness of the environment certificate (which IBM has to provide when it submits a compiler to the government) particularly important. In fact, the question arises as to whether the currently required certificate is adequate to protect the government requirements.

This particular Cobol compiler happens to be Version 2 of Series/1 EDX Cobol, but IBM's recent actions in releasing the unapproved version raise important questions of general importance and highlight new testing requirements that are necessary as Cobol spreads into smaller, terminal-using systems.

Decision in Error

The EDX Cobol problems arose when someone decided that commercial systems could be quickly grafted on top of a noncommercial operating system. This decision must have been made without adequate study, and probably without an adequate understanding of the nature of the operating system concerned — originally an installation-developed laboratory system for a different IBM computer.

In any event, the necessary modifications, planning specifications for memory usage and so forth were apparently all approved without anyone noticing that the commercial symbol "@" had been appropriated as a line feed; and no true provision for printing had been made. In fact, if anyone had taken these factors into account, the system may have lost its key virtues — its ability to serve users with 64K to 128K memories and its readiness for delivery three months after announcement in April 1979.

There were, and are, other problems which make the whole concept of an EDX suitability for Cobol questionable — such as the low maximum file sizes, the frequent need to have non-Cobol programming skills and so forth. However, the printer area was, and is, at the center of the crisis.

The problems appear to have become visible only after the first version of EDX Cobol was tested and subsequently released. The testing by the government, and apparently also by IBM's Quality Assurance, is not done in a working-style operation, simulating the way this system is supposed to operate. Instead, it is done in a dedicated mode, with small files, restricted test data and, most important, with no sharing of printer facilities.

This nonrepresentative environment permitted a faulty compiler to pass the test. However, in addition, IBM provided an environment certificate that did certify to some extent that the other environments would not change the performance.

It is quite probable that at the time, no one at IBM knew any better. However, it is possible that the wording of the IBM certificate took advantage of a semantic loophole in the government's requirements and was only intended to mean that the government standard tests, if run in the restricted environment, would run similarly.

Operational Failures

However, users found that the important printer outputs were not coming out properly or even identically from one run to the next. Payslips, invoices, mailing labels and other runs would start with correct positioning, but soon would be off by one, two or more spaces, making the whole system break down. Messages created by the operating system utilities would be mixed into the printouts, and mysterious line feeds would crop up.

Early investigation indicated that whenever the commercial "at" sign

(Continued on Page 70)

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"Smart is beautiful."
Don Adams

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It's beautifully flexible. There are two basic models. Executive 80, Model 20 is optimized for top price/performance in buffered or conversational environments. Model 30 is designed for high performance editing. Each can be ordered with detachable keyboard, and a 15 inch smooth scrolling monitor — the standard is 12 inch — which selectively displays either 80 or 132 column formats in normal size or double height and width.

It's beautifully reliable. The terminal has Hazeltine's traditional quality, to be sure. Executive 80 adds powerful self diagnosis, enabling the terminal to isolate its own failures. That means faster, less expensive maintenance.

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LETTERS

Significant Blanks

I have been following with interest the debate on significant blanks in Fortran which has recently entered *Computerworld's* pages. While not ideal, I believe that perhaps the solution I use in the language definition for the project language in my Compiler Construction courses at San Diego State University may provide the answer.

I use a "visible blank" which has a printed graphic but has the properties of the blank in current Fortran (it is ignored except in character strings). By choosing the underline graphic (_) as the visible blank, all the "good properties" of Fortran's blank are maintained, while the "white space" blank (no printed graphic) has syntactic importance as in nearly every other language.

Michael D. Shapiro
San Diego, Calif.

Censorship in ACM

I concur with the attack on censorship in the Association for Computing Machinery (ACM). It exists not only for campaign statements, but also for technical correspondence in the newsletter for at least one Special-Interest-Group (Sigplan Notices).

Seymour J. Metz
Washington, D.C.

Warning, Not Threat

"DPer Claims Manual Syagen More Economical" [CW, April 28] is a good example of why the public is reluctant to talk with reporters. They appear to have a dislike for a company such as IBM and they twist your comments to serve their purpose.

There is an extremely poor choice of words used in the article which overshadowed the whole story. The article said IBM "threatened" Central State University, saying it was not responsible if the 4331 didn't work. Assistant Computer Center Director Maithreyi Manoharan actually said, "IBM warned us that it was our responsibility and Telex's responsibility to be sure Telex peripherals would be compatible with the 4331." This is the only position IBM can take. This is not a threat.

Another error is the statement that the 3310 disk drives were ordered with the 4331. This was a misunderstanding. We had planned to use other disk drives with the 4331. We ordered the 3310 disk at about the time the 4331 was shipped.

Bill Jenkins
Director of Computer Center
Central State University
Edmond, Okla.

Areas to Emphasize

As a new subscriber to *Computerworld*, I have been trying to evaluate just how it benefits me as a DP worker. Certainly CW packs an incredible amount of news and advertising into each issue; but most of this material is irrelevant to me, unfortunately.

I am always looking for two things:

(1) Evaluation of equipment — computers, peripherals, systems and so forth.

(2) Announcement of new software which may help me in my job.

I would like to see CW increase its emphasis in these two areas. For example, in the April 14 issue, CW published benchmarks for the IBM 5110. This is a machine that receives a lot of attention, and it was most interesting to find that it really did not rank that well. I would have liked to know how the other systems came out in these benchmark tests.

I would like to see lots more product evaluations. Just look at what a (potential) competitor, *Infoworld*, is doing in this area.

As another example, CW mentioned a job accounting system, Komand, in the April 21 issue. Although this is appreciated, feature articles which compare Komand with comparable software products would be much more useful.

Roger W. Berger
Ames, Iowa

Coverage of IDMS Meet

We would like to thank *Computerworld* for the extended coverage in recent issues regarding Database '80, the annual meeting of Cullinane Corp.'s IDMS User Association.

These articles came as a pleasant surprise to us since we didn't know CW would be at the meeting. Actually, it turns out that it was the IDMS User Association chairman, Larry Towner, who was kind enough to extend the invitation to CW.

I must say that we appreciate all Larry has done for Cullinane and the users association over the years, including his sometimes controversial articles printed in CW supporting Codasyl data base systems.

We would like to wish Larry success in his new position at RCA Corp., where he is responsible for IDMS-related activities.

John J. Cullinane
President
Cullinane Corp.
Wellesley, Mass.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

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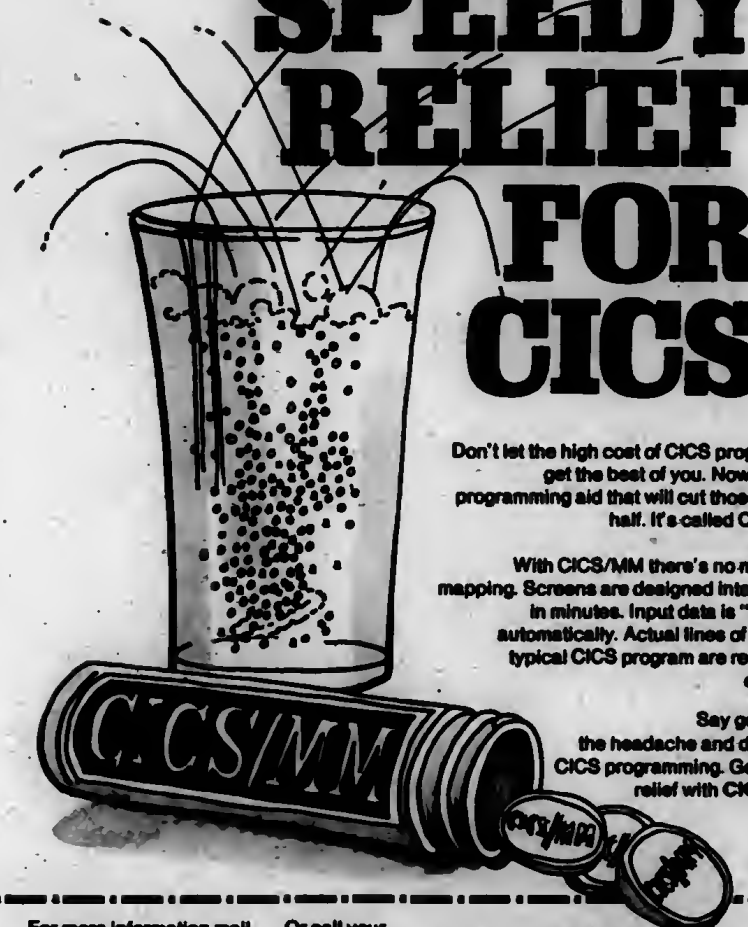

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HUMAN CONNECTION/Jack Stone

DPer Describes First-Time-User Syndrome

One of the secret desires that nearly all of us DPers have is to make some great discovery to further the health and wealth of mankind. Well, I've never done it, but I came mighty close to it recently when I interviewed a DPer who did.

Doris Goldman has conducted research on an interesting phenomenon during her 17 years with vendor organizations. Recently, she synthesized her heuristic data and developed the theory of "computamania," a syndrome that affects the vast majority of first-time computer users. This article is the first revelation of the results of her research, and I'll let her tell you about it in her own words.

"The syndrome appears to apply when a complete system is installed for the first time in a small business or in a department of a large business. It seems to afflict only the senior executive — the one responsible for DP decisions — regardless of industry.

"I have identified five stages of psychological change that characterize computamania, which I will briefly describe. The illustrations I will use are drawn from my studies of small business owners, because they exemplify the syndrome in a dramatic way; however, similar cases may be found in the first-time user population within large organizations.

"Anxiety characterizes Stage 1. The need for a computer wells up inside small business owners as a result of a number of external pressures:

"• Horror stories about operating failures that used to circulate around the locker room at the country club are being replaced with the braggadocio from owners with — presumably — successful installations.

"• The Radio Shack ads on TV in which children are whizzing along with their programming lessons make the owner feel that the computer will help solve many business problems that couldn't otherwise be addressed.

"• Customers show owners letters that the competition is sending out, the ones with the roughened edges, and remark, 'Now these guys are really progressive — they're computerized!'

"• 'I've got to have one!' runs rampant through the owner's mind.

"Compulsion marks Stage 2 of the syndrome, along with recurring fantasies in which owners see themselves in a sort of Star Wars mode. They conjure up images where they are sitting before a complex of lights, keys and switches and interrogate their very own mainframe for answers to virtually any business question. This stage is also the era of 'Justification Through Rationalization,' when the owner dredges up all reasons wise and foolish to make sure the machine will be ordered, including 1) pulling Junior out of college where he wasn't doing very well anyway and sending him off to programming school and 2) combing through the tax codes to calculate write-offs for the computer investment.

"Confusion prevails in Stage 3. First, the hardware vendors flock to the owners and inundate them with long lists of hardware features that are needed to handle the work load, peppering them with embarrassing questions about inventory counts and billing data. The owner typically assesses his accounts payable work load as follows: 'Sadie, my bookkeeper, handles the details for me, but it's no problem because we only send out 500 invoices a month and she does it all in an afternoon.' He learns from Sadie the next day that it's more like 1,000 and it takes two people three days to send them out.

"After the owner begins to feel comfortable with a hardware configuration strategy, Junior comes home one evening and opens up new psychic wounds when he asks, 'And what software packages are you going to use?'

" 'Software? Whadya' mean?'

"Frustration overcomes the owner in Stage 4. After the hardware is unwrapped and plugged in, the owner is asked where the stock paper is kept. 'Paper? Thirty-five thousand dollars for a computer and it doesn't come with paper?' So there's a slight delay of four weeks waiting for supplies. And as soon as the paper comes in, the bookkeeper goes out — either the front door for the last time, or the back door for the first time (where some liquor has been secreted).

"The owner becomes obsessed with wasted paper. 'Why do they always use 132 columns? Can't we get rid of some of those data items and cut it down to 80? Why should the accounts receivable report be 70 pages long? Do we really need it?

"And then the owner verbalizes his doubts about the system. 'It's not doing all the things the vendors promised. If it were programmed right, we could get it all on the TV.

"Euphoria envelops the owner in Stage 5. Realism has replaced far-out aspirations and, although a lot of griping spews forth, it's on a private basis, because now the country club lounge rings with the owner's words, 'Of course, I've got my own mainframe, and she's a real beaut!' "

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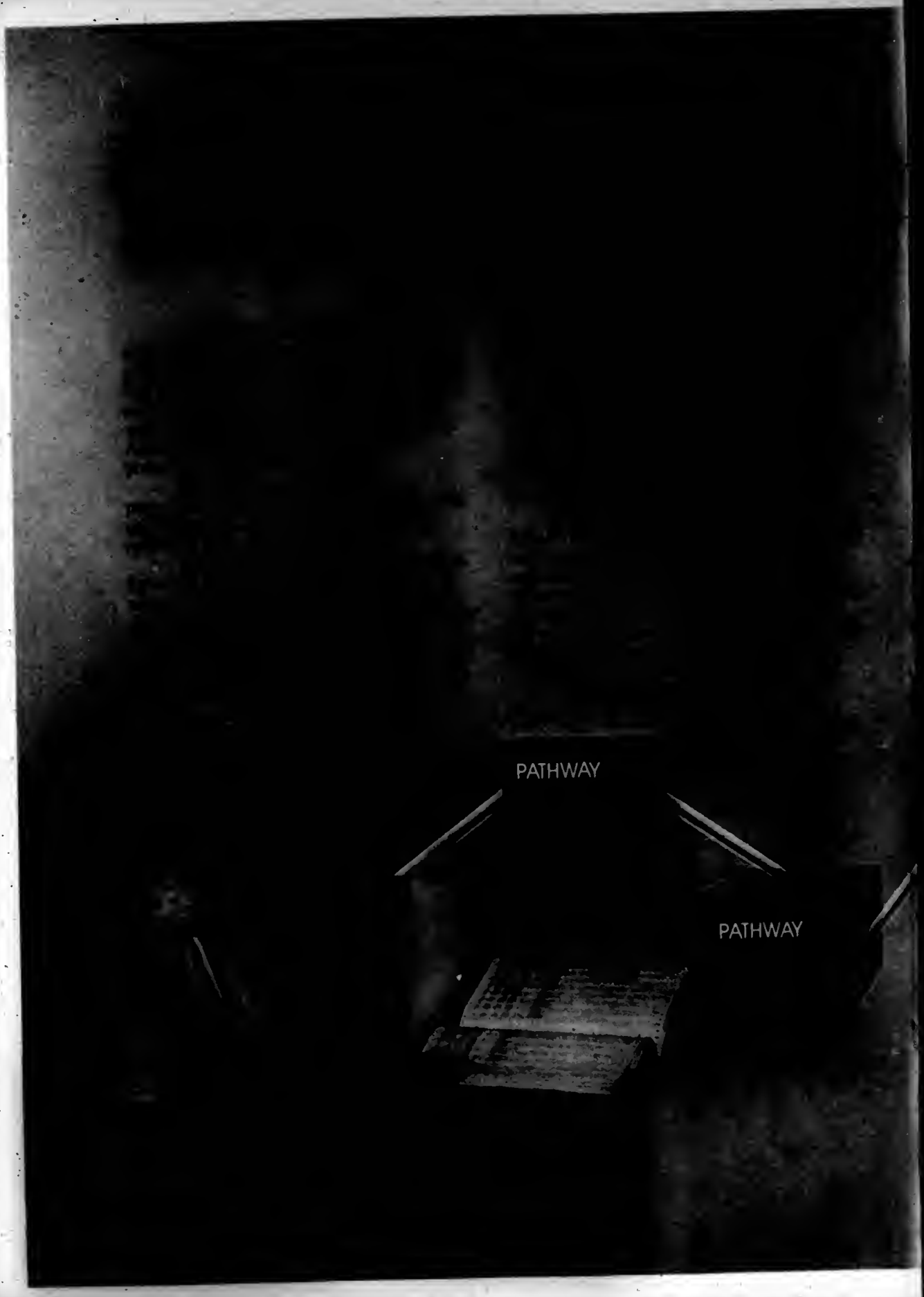
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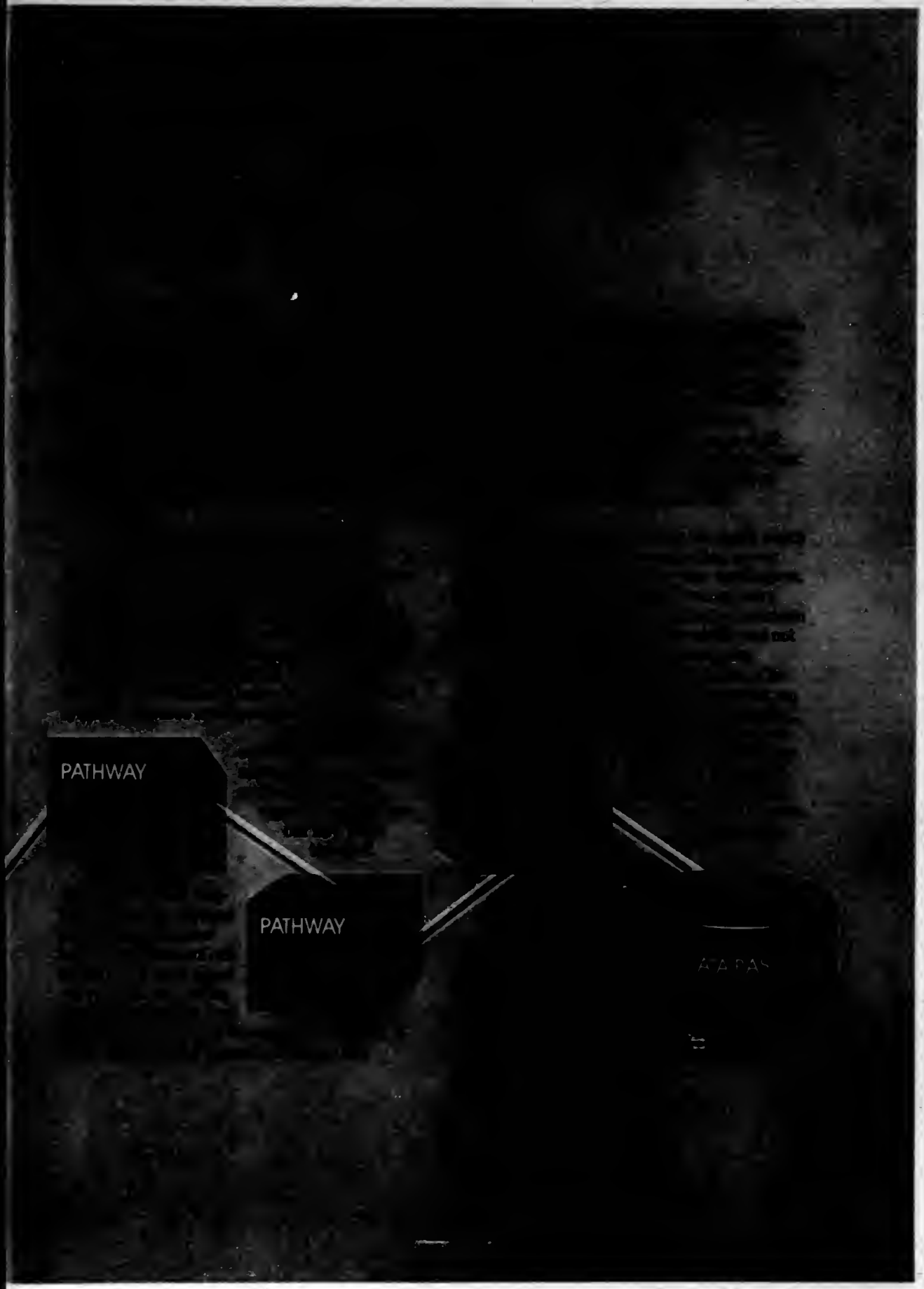
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Faulty Cobol Evading Government Tests

(Continued from Page 63)

was used (as in many circumstances including invoices, mailing labels and check-overwriting), the compiler didn't print it at all! In fact, ® is a perfectly good Ascii and Edcdic character and is carried in the EDX Cobol manuals as such.

The reason the ® was not printing was soon traced to its use as a line feed in the terminal software, combined with the lack of any dedicated printer software. The terminal software was the only available driver for the printers on the system.

Complaining users were told that it was their responsibility to avoid the commercial ®, and many did. But still their payslips, invoices and so forth refused to stay reliably in synchronization with the preprinted forms during live operations. Instead, pieces from other outputs or simply additional line feeds could botch an otherwise good output.

No Spooling

As it turned out, while the system is supposed to be able to run multiple programs, including multiple Cobol executions, there were no spooling capabilities. As a result, the output for each program was sent to the first non-engaged printer! Line by line and line feed by line feed. The problem could be cured if each operational program was given a dedicated printer (even if it had no programmed output), but any sharing of printers was frowned on.

Printers are quite expensive, and few installations had planned to dedicate a printer to each job. IBM responded internally by organizing customer training classes so that no concurrent printing should take place (by having the groups do the tasks in different orders, keeping them away from the full use of the system) and by telling other users that it was *user* responsibility to establish a suitable operating schedule!

In suggesting that users continue to use the EDX as the 64K Cobol, IBM is effectively claiming that everything is OK for future full Cobol use here, but IBM's own information about the situation indicates that it is not intending to deliver such a full and unrestricted Cobol environment to 64K users.

This brings us all the way back to that government certificate. As it is written now, all that this says is that in environments other than the ones tested, the *tests* would produce the same results. Well, if the tests were run in dedicated form in those environments, perhaps so. And even if they are run in nondedicated mode, they very well may produce the same results. It's just that they won't ever be reliable and often can be almost guaranteed to fail unless expensive restructions on execution mixes are followed.

By distributing this second version without letting the government people know about the problems, IBM is encouraging its own people in their ostrich philosophy of not facing the real questions posed by the "successful" passing of the tests with a compiler which is now known to have been unreliable.

Hopefully now IBM will withdraw this compiler until it is grafted on a *commercial* operating system. In addition, it should help the government provide real tests that catch this type of unreliable Cobol.

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Terms Should Follow Standard

(Continued from Page 63)

realized when the floating-point arithmetic elements use the same arguments over and over. The FPS machines have multiple data paths and memories, such that our users report sustained full 12M Flops on inner loops, and 6M Flops or more on a nontrivial algorithm, overall.

One last point. The IEEE suggests not confusing "instruction" and "command." It recommends that command mean the actual electrical signals which cause an operation to occur. "Order" is suggested as being appropriately used to denote sequence and not used in the sense of instruction or command.

Winningstad is president of Floating Point Systems, Inc. Portland, Ore.

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DBMS for minicomputers is irrelevant, inefficient and unproven.

LETTERS

Software Dictatorship

The May 5 Human Connection article, which suggested that the solution to management's lack of training in DP is to install a new breed of software experts in the management ranks, addressed a complicated issue in a rather superficial manner. Carrying the solution to its logical extreme, would Jack Stone suggest that the solution to DP's lack of training in management is to install management experts in the DP ranks?

I'm afraid that neither strategy would bring about the desired result, that is, greater understanding between disciplines. To arbitrarily elevate DPers to executive or decision-making levels in the organization raises several questions.

First, why did Stone separate executive from decision-making? Aren't the two synonymous? Second, to be effective in a management role, the software expert will be required to present and to win support for technical projects and proposals from a still yet-to-be-trained management team. Third, I'm sure that Bill Delaney would agree that his responsibilities as president of a company of DP experts require a great deal more than DP expertise.

In closing, I would like to add that I agree with Stone and Delaney's motives; however, the proposed solution smacks of installing a software dictatorship that delivers edicts whenever collective bargaining fails to recognize the wisdom inherent in the software approach to problem-solving. I am strongly in favor of increased participation by software professionals in the decision making process since participation will foster communications, which in turn will foster participation, and everyone — DPer, management and user alike — will receive the "training" they presently lack.

Robert L. Fluegel
Glastonbury, Conn.

Qualifying as Engineer

"Who Rates as 'Software Engineer'?" Certainly not Larry Long, author, DP consultant and professor.

Long is a bit short on ethics and practices. His reply in "Turnaround Time" [CW, May 5] opens the question of whether he is responsible enough to be given a column in a national publication.

Would he recommend, for example, that is okay for the nondoctor to advertise himself as an M.D. to the public as long as he doesn't get caught and because he has gone to the expense of having cards printed? Or how about calling yourself a university professor because a university does not give an examination for professors?

Donald M. Pries
President-Elect
Chicago Chapter, Illinois Society of Professional Engineers
Chicago, Ill.

Legal Implications

In "How to Handle Unreasonable Contracts" [CW, April 7], Alan Taylor gave some sound advice. I would like to comment on some of the legal implications of his recommendations.

Basically, Taylor advocated that the purchaser record the vendor's description and claims about his computer. Indeed, these records must be maintained as part of the purchaser's "ordinary course of conducting business." If these procedural steps are strictly followed, any statements or claims by the vendor and so recorded may be introduced into evidence in subsequent litigation.

While this procedure has merit, it must be balanced against the terms of the contract which has been signed by both parties. Typically, all sale contracts will contain a vendor disclaimer-or-warranty clause, which voids any representation made by the vendor's personnel except as incorporated into the written contract. Absent any proof of fraud on the part of the vendor, this disclaimer is aimed at suppressing the same evidence which is to be introduced under this business record rule.

The maintenance of these business records has several collateral, but extremely important, side effects. These records will be the basis to prove fraudulent conduct on the part of the vendor.

Fraud will enable the purchaser to void the sales contract, with its associated limitation-of-liability clause, and expose the vendor to virtually unlimited liability for any damages caused by the computer. These records will also strengthen the purchaser's negotiation position with the vendor.

The purchaser should always be cognizant that the stricter the procedural rules he follows in maintaining the business records, the more creditability the court will give to these records. If the same type of records are kept for all types of sales transactions, the court will be more likely to accept them into evidence.

David J. Connelly
Bricktown, N.J.

Minicomputer TOTAL. The DBMS that shatters the myths.

For companies building minicomputer based systems, there's a fresh opportunity to design and implement integrated information systems right from the start.

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Boole & Babbage Unties 'Control/IMS'

SUNNYVALE, Calif. — Users of IBM's IMS data base management system can now purchase separately either of the two report-generating facilities of Boole & Babbage, Inc.'s Control/IMS transaction accounting and performance reporting system, marking the first time the firm has unbundled components of any of its software products.

Formerly available only by buying the Control/IMS package for $17,000, the vendor's IMS Performance Reporting System (PRS) is now sold individually for $12,000, while the IMS Transaction Accounting System (TAS) can be purchased alone for $7,200.

Boole & Babbage is also offering PRS and TAS at a 30% discount to users that purchase either one in conjunction with any of the firm's other products that carries a higher price tag. This discount applies whether or not the more expensive product is part of the vendor's Resource Accounting line, which includes Control/IMS, Control/IMS Realtime and Control/SMF.

Under this policy, a user could buy PRS for $8,400 if, for example, it also purchased Control/-IMS Realtime, which sells for $13,000. Similarly, TAS would cost a user $5,040 if purchased along with Control/SMF for $9,000.

These new pricing policies are effective immediately. They follow recent layoffs Boole & Babbage made, the firm said, in anticipation of a slowdown in sales over the next few months [CW, April 28].

A company spokesman claimed the pricing announcements were not a reaction to the expected drop in sales, but did say they offer "another possibility to generate revenues."

The decision to unbundle PRS and TAS targets IMS users that already have either a performance reporting or transaction accounting system. "There's no way we can force someone to buy more than he wants, so we were losing those sales," he said.

PRS and TAS operate on IBM 370, 30 series and compatible computers with all releases of IMS/VS under the SVS, VS1 and MVS operating systems. Boole & Babbage is at 510 Oakmead Parkway, Sunnyvale, Calif. 94086.

ADR Plans Product Integration

By Marcy Rosenberg
CW Staff

NEW YORK — Applied Data Research, Inc. (ADR) plans to further integrate its systems software line through "redesign" and "expansion" of products by the fourth quarter, the firm said at a recent press conference here.

Facilities that will add capabilities or expand the number of operating environments for certain of ADR's products will be released periodically during the year, according to Martin A. Goetz, senior vice-president.

The first of these facilities was introduced in March, when ADR described a three-phase plan to integrate The Librarian and Datadictionary into a single resource control facility to be called LIB/DD [CW, March 10]. At that time, the firm implemented Phase One by adding a COPY/DD command to The Librarian/VS, giving it the capability to incorporate Datadictionary data descriptions into Librarian source programs.

By the second quarter, ADR said it will enhance Datadictionary so it can be automatically updated to maintain information relevant to The Librarian updates. Due out in the third quarter is an expansion of LIB/DD to include total management control over source programs and data descriptions.

About other product integrations, Goetz was less specific. However, he did say that in the third quarter ADR will introduce an internal program called the Virtual Telecommunications Processor (VTP). VTP will allow the firm's on-line Extended Text Compositor (ETC) to run under ADR's Datacom/DC data communications control system and under the Roscoe remote job entry system for OS and VS environments. Currently, ETC operates on-line only under CICS.

In addition, a facility for ADR's Metacobol family of Cobol programming aids is due out in June or July that reportedly lets users write programs for Datacom/DC and the Datacom/DB data base management system.

Data communications products will also be "release-integrated" with others in the ADR line, including The Librarian and Vollie, an on-line program development system operational under CICS DOS/VS. Other plans call for integrating Look, a real-time software performance measurement system, with Datacom/DC.

New software facilities and product interfaces will be provided at no additional charge to ADR users currently under maintenance contracts. Goetz anticipates no adjustments in pricing for system software products, all of which can still be purchased individually.

'VIP', Enhanced Fortran Support Univac V77 Users

IRVINE, Calif. — Univac has released the Vortex Interactive Package (VIP), an enhanced Fortran IV compiler and two diagnostic programs for its V77-600 and V77-800 minicomputers.

VIP is said to allow Univac's QL/77 inquiry language to access a Cincom Systems, Inc. Total data base management system in an interactive mode. It also offers a report writer.

Also part of VIP is Mite, an interactive, line-oriented editor that can be used to enter and edit source code and programming languages including Fortran, Cobol and Pascal.

The Fortran IV compiler supports previously announced floating-point hardware and provides higher speed and more accuracy, the vendor claimed.

The two diagnostic programs are called System Test and On-Line Test. System Test performs fault isolation independently of the operating system.

On-Line Test offers the ability to test and exercise disk and magnetic tape I/O. Memory and printers can also be tested concurrently with execution of other programs under Vortex II control, Univac said.

VIP costs $1,500, the Fortran IV compiler costs $2,000 and the two diagnostic programs cost $500 each. All releases are currently available except VIP, which will be available in the third quarter.

'Datamanager' Linked to 'Shadow II'

LEXINGTON, Mass. — An interface with Altergo Software, Inc.'s Shadow II transaction processing monitor is now available to DOS users of MSP, Inc.'s data dictionary system, Datamanager.

The interface provides support for all Data manager facilities under Release 3.0 of Shadow II, MSP claimed. It is said to include a sign-on panel with password masking, forward and backward paging using program function keys and screen editing for updating dictionary definitions.

The Shadow II interface is Datamanager Selectable Unit No. TPS and costs $1,800 from MSP at 21 Worthen Road, Lexington, Mass. 02173.

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From Idea to Profit — Part 3

Naming, Pricing, Packaging Present Challenges

By A.L. Frank
Special to CW

Once a software author has designed, developed and tested the package and carefully defined his market, the next challenge awaits him — namely, how to name, package and price his product.

Surprisingly, one of the more difficult and potentially time-consuming aspects of developing a product is finding an unused name. The amount of time spent researching a name should be considered in light of the probability that most marketing organizations will change that name to comply with their own naming conventions.

But if the author does invest the effort in finding a name, he should also consult legal counsel in order to register it as a trademark.

A next step is to package the product for sale. To do this, the author needs to develop promotional materials that make the benefits of the product's features immediately obvious.

Part three of this five-part article on bringing a home-grown software product to market focuses on how to name, package and price your wares. Next week: how to approach software companies to sell the product.

This material includes a brochure or summary of features and benefits, a product description and materials for presenting the product such as slides or transparencies used with an overhead projector.

The most important of the marketing materials is the product description, which should tell, in some detail, what the product does on a feature-by-feature basis. It should also point out some of the pertinent technical information necessary to understand how the product works.

A product description must be organized well enough so that the potential buyer can easily determine in about half an hour what the product can do. It should also reflect the level of quality the developer wishes to project in his product.

Cheap copy-machine reproductions, then, are to be avoided. On the other hand, a very expensive glossy production is an unnecessary expense. A carefully typed and formatted product description that is reproduced with an off-set printer usually suffices.

Documentation is also a critical part of the product package. A professional-quality user guide that clearly explains how the product is used will enhance the product's marketability.

Sales Presentation

A sale presentation is an additional bit of packaging that can be prepared. The value of a sales presentation depends largely on how well it conveys the product's concept in an organized fashion.

A well-structured 30- to 60-minute presentation will add to the attractiveness of a product because the core information needed to sell it to users has already been assembled.

The developer should prepare a formal script for the presentation. While it need not be memorized word for word, a script will provide the author with something to fall back on and give the software company another tangible piece of the product package.

Even though a developer may be fully capable of achieving the highest standards of quality in his product, he may not have the marketing or technical writing expertise to produce a professional-quality brochure, product description and user guide. If this is the case, he may want to consider using a consultant or organization that is familiar with software to help develop this information.

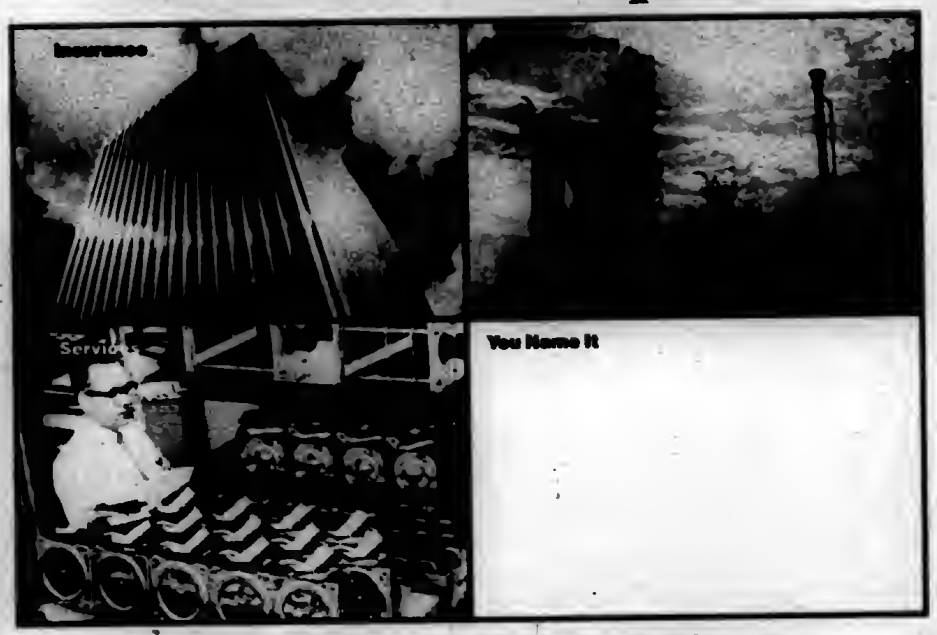
This additional investment, however, should be weighed against the potential enhanced value of the product. If the developer's own marketing materials and user guide reflect poorly on the product, then the investment is worthwhile.

It should also be noted that most software companies are willing to accept products without accompanying marketing materials since they would probably modify those materials anyway to conform to their own style. But the better any existing marketing materials are, the more attractive the package is and, therefore, the better the developer's bargaining position.

However, one part of the product package a developer should definitely include is an enhancement plan — that

(Continued on Page 80)

When it comes to companies...



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We picked a few areas to highlight above, but as you can imagine, virtually every type of business, industry and organization; banking, transportation, food processing, retailing, government, service bureaus ... organizations of all kinds have come to Cyborg for our system's efficient, speedy general payroll and personnel handling capabilities.

For example, the Cyborg System handles more than 300 types of earnings *per employee* with job related rates and special taxations. Hourly, salaried, weekly, bi-weekly, semi-monthly, monthly ... any user-defined frequency required.

The system is designed for large corporations; multi-company firms; multi-location firms and service bureau organizations. Handles taxes on a federal basis, for all 50 states and thousands of counties and cities ... and Canadian taxes for Federal, CPP, QPP, UIC and provincials.

In addition, the Cyborg System keeps current, monthly, quarterly and year-to-date tax and earnings figures on all employees in all locations, plants or locales.

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919

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'SIR' Enhanced to Run Under OS/VS

EVANSTON, Ill. — Scientific Information Retrieval, Inc. has enhanced SIR, its data base management system, to operate on IBM 360 and 370 series mainframes under the OS/VS operating system.

Version 2.0 of SIR is available for TSO and CMS and is said to support complex hierarchical and network file structures.

The system uses an English-like language and interfaces with most statistical packages, such as the Statistical Package for the Social Sciences and Biomedical Program.

SIR features include multiple record types; an SPSS-like data definition language; data editing including range value and consistency checking; and data security at the item and record level.

SIR costs $5,000 for a one-year lease. Subsequent leases cost 80% of its current list price.

Besides the 360/370 series, SIR runs on Control Data Corp's 6000 series and all Cyber series models except the Cyber 176. Scientific Information Retrieval vendor can be reached at P.O. Box 1404, Evanston, Ill. 60204.

Along With Screen Editor

TSO Gets Utilities Enhancement

PALM BEACH GARDENS, Fla. — Applied Software, Inc. has added s utilities enhancement and s full-screen editor to Its TSO/Superset product line for users of IBM's Time Sharing Option (TSO).

TSO/Superset-Utilities is said to enhance the performance of standard IBM utilities to TSO users. It enables TSO users to employ the LISTJES command to preview SYSOUT data sets prior to printing using full-screen display capabilities in either the 80- or 132-col environment.

In addition, by selectively printing only those output items currently needed, TSO/Superset-Utilities cuts turnaround time and reduces unneeded printouts, the vendor claimed.

Applied Softwars also released the Full-Screen Edit (FSE) package. TSO/-Superset-FSE is a TSO edit subcommand that lets the user edit up to 20 lines of the edit data set per swap by using terminal hardware features. Said to reduce ths swap load, the package reportedly improves ths system's performance and boosts user productivity.

Other FSE features include support for all data set types; hexadecimal editing; forward and backward paging along with half-paging; and local and remote terminal support.

TSO/Superset-Utilities is included with the TSO/Superset cost of $130/mo. TSO/Superset-FSE costs an additional $140/mo, the vendor said from 4440 Suite 204, P.G.A. Blvd., Palm Beach Gardens, Fla. 33410.

VCI Production Control Aid Gains Multilingual System

CHERRY HILL, N.J. — Value Computing, Inc. (VCI) has released a multilingual, on-line system for its Automated Production Control Software.

This On-Line Data Base Maintenance Subsystem allows all commands and I/O to be changed into foreign languages. This is done by supplying a new Csect with the original language version.

Ths package is available to users of VCI's IBM OS/VS Production Control Systems at no additional cost.

For non-VCI users, the package ranges in price between $49,000 and $56,000 depending on the operating system and requires 160K bytes of memory, the vendor said from 300 VCI Building, West Marlton Pike, Cherry Hill, N.J. 08002.

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TI765 Bubble Memory Terminal	2,585	249	146	84
TI810 RO Printer	1,995	182	101	86
TI820 KSR Printer	2,195	210	117	79
TI825 KSR Printer	1,995	182	99	81
ADM3A CRT Terminal	875	84	47	32
ADM31 CRT Terminal	1,450	139	78	53
ADM42 CRT Terminal	2,199	210	117	79
QUME Letter Quality KSR	3,295	316	176	119
QUME Letter Quality RO	2,895	278	155	105
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HAZELTINE 1500 CRT	1,199	115	64	43
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Correction

Ths articls sntitled "On-Line UFO Aids, Abets Chicago Police DP" [CW, April 28] stated that UFO's response time is almost double that of CICS/-VS. UFO's CPU cycles are double those of CICS/VS, but response time remains the same as with CICS/VS, according to the Chicago Police Department.

Also, bugs and poor documentation at initial installation of UFO have since been corrected, the department said.

"NCR's VRX is more transparent than any operating system I have ever seen."

Peter P. Blozis, H.J. Wilson Co., Inc.

PETE BLOZIS:
"I've been in EDP for 19 years and have gone through many conversions. So I anticipated problems in installing our new NCR V-8585M. It turned out to be the smoothest conversion I ever experienced."

LEA EDMUNDS:
"We had good reason to be apprehensive. We were putting in the first V-8585M to be installed anywhere. And, at the same time, we were switching to new operating software, NCR's VRX. We ran parallel for three weeks and never developed a conflict. As it turned out, we could have switched over in a single day."

PETE BLOZIS:
"We resisted conversion as long as we could, and then discovered it was completely painless. The V-8585M hardware ran just as NCR predicted. VRX is more transparent than any operating software I have ever seen."

Peter P. Blozis (right) is Wilson's Vice President, Information Services Division. Lea Edmunds is Technical Services Manager.

* * *

WILSON'S is a chain of jewelry/ catalog showrooms that is spreading across the Sunbelt. And growing at the impressive rate of 37 percent per year. This growth has caused Wilson's to step through five NCR Century systems up to the V-8585M. Supporting an NCR system is easy. As Pete Blozis says "We can support our NCR V-8585M with fewer systems programmers than we'd need for other systems of comparable size."

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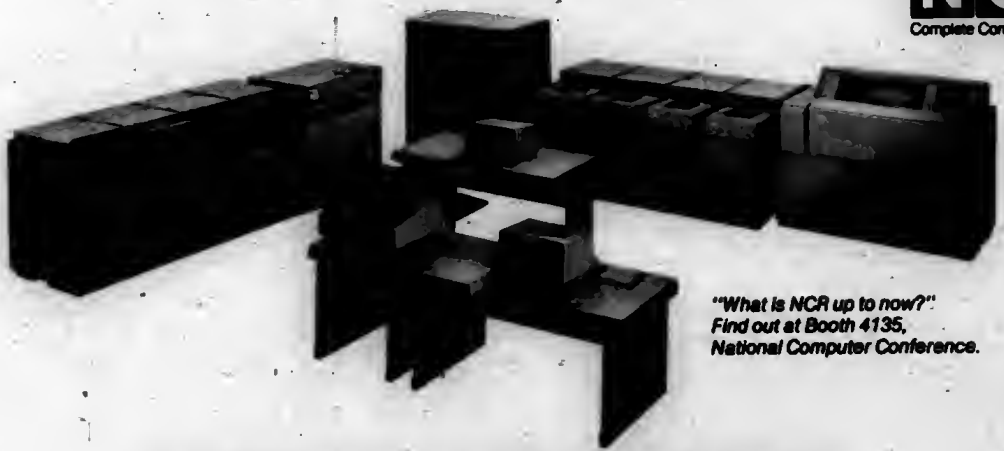

"What is NCR up to now?" Find out at Booth 4135, National Computer Conference.

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Wang Unveils Software for Electronic Mail

LOWELL, Mass. — Wang Laboratories, Inc. released entry-level and intermediate versions of its Mailway electronic mail system, plus a Mailway Distribution Controller said to provide central management of electronic mail functions to users not requiring DP capabilities.

The firm also introduced a list processor for its Office Information System (OIS).

Designed for first-time users, the low-end version of Mailway, Level 1, operates from workstation to workstation on Wang's word processing systems or OIS. Level 1 software costs $200.

The intermediate Level 2 package incorporates the distribution controller, MDC50, and is said to feature centralized control and automated mail collection and delivery. Options include multizone ability, multiport capability and priority arrangements for immediate document distribution and scheduled distribution.

A word processing interface option offers word processing and electronic mail support to users at workstations locally connected to MDC50.

The MDC50, which is not user-programmable, is said to include intermediate storage for "store-and-forward" mail processing; I/O peripherals for administrative control and reporting; and communications equipment for automatic collection and distribution of mail between distribution points.

Level 2 package prices start at $57,000 including MDC50 and distribution center software. Distribution point software for word processing or OIS systems costs between $200 and $400 per system.

Level 3 Mailway allows a Wang VS processor to function as a distribution center for users who need both electronic mail and distributed DP power, Wang said. Base price is $7,000; distribution point software costs between $200 and $400 per system.

A new list-processing option for Wang's OIS is said to let users selectively create and record customized lists of information that can be selectively retrieved and printed in tabular reports, letters or on preprinted forms.

This package costs $1,000, with deliveries slated to begin in July from the vendor at One Industrial Ave., Lowell, Mass. 01851.

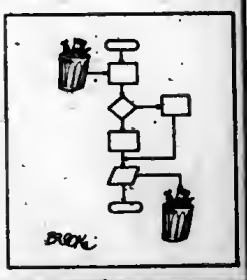
Package Aids Management Of Property

FOSTER CITY, Calif. — A real estate property management system for Radio Shack's Tandy II business computer is available from Alar, Inc.

The package is said to offer financial control on multiple properties along with processing of multiple properties with individual property audits. The package also eliminates some bookkeeping requirements by retaining financial information, the vendor said.

Other features include delinquency reports, vacancy reports, rent roll reports, management fees reports, lease expiration notices and tenant detail listings. The package also produces balance sheets and trial balance sheets.

The package costs $2,500 and requires 64K bytes of memory. The vendor is located at Suite 2, 1261 Hillsdale Blvd., Foster City, Calif. 94404.



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Zip Code Conversion Aid Offered

BURLINGTON, Ont. — A Canadian software house has announced a package to aid in the conversion from the U.S. Postal Service's five-digit Zip Code to the nine-digit code to be introduced next February.

D.W. Lark Ltd.'s Name and Address Coding System (Nacs) allows user address files to be entered for conversion in any form; the package then arranges them so they can be matched to the longer Zip Code.

The "free-form" style of encoding will permit the U.S. Postal Service files — which contain addresses and their appropriate nine-digit codes — to be run together with the user files so that the addresses in one match the addresses for the other, a requirement for correct matching of the five-digit code to the nine-digit code.

Nacs can be purchased for $10,000 or leased for three or five years for $350/mo and $285/mo, respectively. Rentals cost $500/mo. Users can elect to have Lark process their files for one-half cent per address plus machine time or can use their own machines for only the cost per address.

D.W. Lark is located at 1306 Janina Blvd., Burlington, Ontario L7P 1K3.

Package Measures Hardware Reliability

McLEAN, Va. — Johnson Systems, Inc. (JSI) recently released a hardware reliability measurement package for IBM systems and an enhanced version of its Apex JCL manager.

JSI's measurement package, Alarm, is said to measure and manage hardware and media failures by using the Logrec file. It includes an on-line monitor that warns of an impending failure to allow DPers to take action before a system crash, the vendor said.

Alarm, reportedly provides the tools to address downtime problems as well as system degradation hardware failures and reruns caused by inadequate maintenance management.

Aid for Managers

The package will help the DP manager define what equipment needs immediate attention and how to improve the vendor's response time. It also provides information to evaluate the reliability of data sets and tells the user when to clean tape drives, according to the vendor.

Alarm is currently available for MVS, VS1, SVS, MVT and MFT sites. The package costs between $5,000 and $14,000.

Enhanced 'Apex'

Also announced was an enhanced version of Apex. Release 3.2 is said to solve production control and work load management problems in OS data centers. In addition, Apex reportedly controls dependencies for job preparation, job submission and pre/-postprocessing events.

Release 3.2 includes an enhanced method of scheduling reports for the production scheduler and production control manager. It also includes Vtam support and local Synchronous Data Link Control (SDLC) protocols.

The package also offers increased flexibility for interception and disposition of special output classes and an extended HELP facility, according to the vendor.

The package costs $25,000 from JSI at 7923 Jones Branch Drive, McLean, Va. 22102.

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DEC Enhances Operating System For Datasystem 150 and 300

MAYNARD, Mass. — A reportedly more powerful version of the CTS-300 operating system for Digital Equipment Corp.'s Datasystem 150 and 300 series of small business systems was announced by the firm.

Called CTS-300 Version 6, the package offers improved functions that will execute utilities 15 times faster, the vendor claimed.

The enhanced version allows program development and debugging to be performed concurrently with standard application activities. Remote debugging can also be performed, DEC said.

The package also features an enhanced keyboard editor and an improved print utility.

CTS-300 can be used on desktop Datasystem 150, 320 and PDP-11/03 systems. It also runs on the Datasystem 330, PDP-11/23 and Datasystem 350. Those systems are based on DEC's PDP-11/34A.

On Datasystem 350, up to 12 online terminals and printers can be used under CTS-300.

The enhanced version of CTS-300 is issued free to current users. An unbundled version is not available. The package requires a minimum of 128K bytes of memory. DEC's Commercial Products Group is in Maynard, Mass. 01754.

Naming, Pricing, Packaging Challenge Software Author

(Continued from Page 74)

is, a formal guide to the steps and time estimates for adding new feature.

The product will probably not be 100% complete at the time it is sold, if only because the developer discovers areas for improvement during development. But providing a software company with a plan for the evolution of the product shows the potential buyer that its value can continually be increased.

Pricing Aspects

With the promotional materials, documentation and enhancement plan taken care of, the developer is ready to tackle one of the trickiest aspects of the project — pricing.

Most marketing organizations will not hesitate to change the price the developer recommends. But if the developer suggests a $50,000 price for a product worth only $8,000 to $10,000, he may scare away a marketing organization by not understanding the value of the product. The same thing may happen if the product is drastically underpriced.

Product pricing is probably the most widely debated area in the software industry. There is no magic formula for coming up with a selling price. There are at least four alternate, but not mutually exclusive, ways to determine pricing for the user market.

One approach is to perform a cost/benefit analysis. The basic questions here are: Can the end-user save money by using the product? If so, what would the yearly savings be? And more important, what would the total savings be over the useful life of the product? The price of the product should be equal to or less than this total savings.

The second approach requires some form of market research. A basic questionnaire can determine approximate perceived value of the product. And the "Delphi" survey method — that is, interative interviews — can provide a more accurate insight.

A third approach is simply to work back from the level of effort to determine a reasonable price. This analysis must consider, at the least, up-front investment. In other words, if $50,000 was invested in development, a developer may wish to receive $25,000 per sale. This allows the end user to tell his management that his development cost would exceed the package price.

The fourth approach is to determine what similar products sell for and to price the product somewhere near those competitors. *Frank, an attorney and former director of corporate development at Boole & Babbage, Inc., is a founder and president of newly formed California Software, Inc. in Los Angeles.*

The Computer-Assisted Instruction System of the 80's:

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Phoenix also has helped solve problems that exist in nearly every educational system: inflation, higher administrative costs and pressure from citizen groups, *because it allows users to do more on existing hardware*, delaying by incredible lengths of time the need to add more hardware and personnel.

Phoenix will run under VS1, SVS and MVS on any IBM 370 or compatible computer. It currently interfaces with BTAM, VTAM, TCAM, CICS and TSO. Interfaces for DOS, CMS and IMS soon will be announced. One copy of Phoenix can interact simultaneously with any combination of interfaces listed. Installation of Phoenix and new releases require *no system generation*.

Why not get Phoenix up in *your* system, and watch your CPU costs go down. All it takes is a phone call or a note.

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• *Human-Oriented Features*

ANAHEIM, Calif. — A series of smart terminals intended for applications such as data entry, form fill, data query and software development is being introduced this week by Hazeltine Corp. at the National Computer Conference here.

As the first two members of the Executive 80 terminal series, Models 20 and 30 provide video highlighting, line drawing, status line, programmable function keys and a horizontal split-screen display, Hazeltine said.

An enhanced video option selectively displays characters at normal font, twice the normal height and width or in a 132-col format on a 15-in. monitor, the vendor stated.

Model 20 is a buffered CRT terminal; Model 30 is an editing terminal with more function key capabilities, transmission modes, paging and data validation features than the former unit.

Hazeltine said it paid close attention to human factors in designing the Executive 80 series. The terminals have green displays with nonglare monitors to reduce eye strain, and the display tilts. Keyboards adhere to the standard format for typewriters and are detachable.

The Executive 80 Models 20 and 30 cost $1,295 and $1,695, respectively. Hazeltine is at 284 E. Pulaski Road, Greenlawn, N.Y. 11740.

• *Editing Capabilities*

FLANDERS, N.J. — A CRT terminal for editing and transaction processing applications is available from Perkin-Elmer Corp.'s Terminals Division.

The Model 1250 Super Owl comes with a choice of two detachable keyboards and/or a light pen as well as communications modes claimed to minimize loads on the host computer system and to maximize host control.

The Super Owl's 12 function keys are programmable from the keyboard in response to menus in the English language or downline from the host, a spokeswoman stated.

Operators can generate messages of up to 400 bytes by depressing a single key, she added, and the Super Owl lends itself to users that frequently switch among modems, time-sharing systems, host mainframes and printers with different requirements.

Unlike most CRT terminals, the spokeswoman continued, the Perkin-Elmer 1250 can transmit just a three-character "Request to Send" message when the operator presses "Send" instead of transmitting the entire 1,920-char. screen.

When the host is ready to receive the message, it issues a "Read Modified Only" command, and the terminal transmits just those fields the operator has changed.

This saves operator time, the spokeswoman said, and both host time and main memory.

Two-Way Communications

The Super Owl's 25th display line reportedly allows two-way communications with the host without disrupting the current transaction.

All 128 Ascii characters are handled by the Model 1250, which also fits most serial RS-232C printers, according to the vendor, at a transmission speed independent of the user's main communication lines.

With volume discounts available, the 1250 Super Owl costs $1,990 with standard keyboard and $2,085 with the optional extended keyboard. Perkin-Elmer's Terminals Division is located at 360 Rt. 206 S., Flanders, N.J. 07836.

CRT Workstations Envisioned As Office Appliances of Future

By James R. Folts
Special to CW

The next generation of CRT workstations — the "office appliances" — will become the standard building block of the office of the future. They will combine the best of minicomputer, word processing and intelligent terminal technologies and set a new standard in making these technologies easy to use.

We at Syntrex, Inc. have spent the better part of a year talking with managers in all kinds of industries about their office automation needs. In these discussions we found a remarkably consistent view.

Managers understand the pressing need to automate their offices. It is quite clear to most managers that an increasing percentage of their work force is committed to office work as opposed to manufacturing work.

They look fearfully at the high inflation rate today and are convinced that something must be done. Their experience tells them that the only way to keep control of their costs is to automate their offices.

However, managers reject the attitude that has been common in word processing that says, in order to automate, they must restructure their organizations.

Managers understand the delicate balance of human relationships that make a successful office organization, and they reject the technologist's attitude that they should tamper with these interrelationships in order to introduce automation.

What Managers Want

What they *do* want in their offices is this: automation units that fit the existing office environment. They want office automation that fits functionally, that fits organizationally, that fits physically and that fits economically in into their existing office organizations.

To meet these management requirements, office automation vendors must develop a new kind of CRT workstation.

This new breed of CRT must combine the functionality of the minicomputer, the compactness of the low-cost CRT, the ease of use of the best word processor, the communication capability of the best intelligent terminal and better reliability and user comfort than any of the above.

This new generation of CRT workstation, which we shall simply call the "office appliance," will become the basic building block of the office of the future.

The office appliance must be more than just a word processor. It must include a highly sophisticated, yet easy-to-use, file management facility that provides automatic file searching and automatic file indexing.

It must provide access to advanced capabilities like electronic mail and automatic spelling checks. And it must provide a way for office personnel to solve information management problems, without programming.

This kind of functionality requires that the office appliance contain a 16-bit computer, memory capacity measured in the

(Continued on Page 84)

FCC Backs Cut-Rate Telex Offering

WASHINGTON, D.C. — The Federal Communications Commission (FCC) has rejected petitions opposing Overseas Telex Routing Service (OTRS), the low-cost one-way international telex service Western Union Telegraph Co. introduced last fall [CW, Nov. 12].

OTRS offers savings of up to 30% compared with the Telex rates charged by the international record carriers (IRC).

OTRS includes both immediate and store-and-forward message delivery. The former messages are routed overseas via CNCP Telecommunications, Inc., a Canadian communications carrier, or Telecommex, the Mexican telecommunications authority.

The subscriber dials the foreign carrier directly in either case. Telecommex and CNCP, plus TRT Telecommunications Corp. — a U.S. IRC — participate in the store-and-forward service. These messages travel from the user's terminal to Western Union's Infomaster switching center in Middletown, Va.

The telegraph company then transfers each message to whichever of the three carriers offers the lowest rate to the designated destination. OTRS is provided between the U.S. and nearly 100 countries in Europe, the Mideast, Far East and Africa.

Meanwhile, the FCC has granted Consortium Communications International (CCI) temporary authority to continue a similar one-way international telex service, pending FCC action

(Continued on Page 84)

It Came From Zonic

Pictured above is Zonic Technical Laboratories, Inc.'s Model 6081 Real Time Display Terminal. Specifically designed to provide control, data display and storage for Zonic's Model 6080 multichannel Fast Fourier Transform analyzer, the combination of both devices is claimed to provide the first real-time spectrum analysis able to support 128 separate parallel input signals. The 6081 costs $9,850. Zonic's address is 2000 Ford Circle, Milford, Ohio 45150.

WE SAW THE 32-BITS. AND

INDUSTRY'S RAISED 'EM.

INTRODUCING ECLIPSE® MV/8000, the fast new processor that gives you high throughput, high performance, and unmatched reliability, and the most compatible 32-bit computer system in the industry.

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You need a 32-bit computer that speaks your language. MV/8000 speaks just about all of them, based on its new, ultra-sophisticated AOS/VS operating system that's compatible with our time-tested AOS (Advanced Operating System). AOS/VS has optimized micro-code for high-level languages like ANSI FORTRAN 77, ANSI BASIC, and ANSI PL/1. What's more, AOS/VS can run COBOL, DG/L, DG/DBMS, TPMS, INFOS II, AZ-TEXT™ word processing, RCX70 (3270) and RJE (2780/3780).

Compatibility? Forget about emulation, mode bits or rewrites. Along with its new 32-bit applications, MV/8000 executes all existing AOS-based ECLIPSE programs. You don't have to change programs, peripherals, interfacing, documentation, or people.

MV/8000, new from Data General. From now on we hold all the cards in 32-bit systems. Bet on it. And win.

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VISIT US AT BOOTH #1339 AT NCC, ANAHEIM, CA, MAY 19-22, 1980.

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☐ Your MV/8000 sounds like a winner. Send complete info. ☐ Deal me in now. Send a sales rep.

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C810

Batch Program Fits IBM Gear

NEW YORK — A program for half-duplex batch communications between IBM mainframes and the vendor's 3740 data entry system and System/3, 32 and 34 minicomputers is available from Computer Dynamics, Inc.

The batch communications program (BCP) reportedly supports IBM's 360, 370, 4300 and 30 series mainframes under all versions of their operating systems.

As a Basic Telecommunications Access Method program, The BCP costs $6,000 under license agreement, including a year's free maintenance, from Computer Dynamics at 10 E. 39 St., New York, N.Y. 10016.

Office Appliances of Future Envisioned

(Continued from Page 81)

hundreds of kilobytes, an advanced operating system, advanced user support programs and sophisticated communications software.

Most important, the interface to all these resources must be kept simple and understandable to noncomputer-trained, office personnel.

Display Characteristics

Let's take a look at some of the display characteristics required in an office appliance. Fitting functionally in the office yields a simple requirement: The CRT display should be as flexible as a typewriter and a piece of paper. The user should be able to do on the CRT screen exactly what he can do with a typewriter and a piece of paper.

This implies screen capabilities like the ability to display single and double underlines, super- and subscripts, bold printing and forms as they are normally drawn.

Many low-cost CRTs offer line-drawing capability to duplicate forms on the screen. The only problem is they usually cannot be used to duplicate preprinted forms because the lines take character positions.

This is contrary to the way people design forms — they draw the lines *between* character positions. A CRT must overcome this problem if the user is to be able to truly duplicate forms on the screen.

Most importantly, a feature of many new office typewriters — proportional spacing — must be a capability of the CRT display. The typewriter can provide it; if we are asking a user who is familiar with the typewriter to install a CRT-based system, the CRT should have the same capability.

For office automation functions beyond word processing, still more screen flexibility is required. Howard Morgan, the University of Pennsylvania office automation authority, has done a number of research studies that indicate that office personnel actively work with about eight pieces of paper on their desk at any given time.

If we are trying to fit a CRT-based appliance to their environment, this implies a "windowing" capability on the display, so that they can work with multiple pieces of information at the same time. Windowing is the ability to divide the display into sections, each of which can be manipulated independently.

A major challenge of office appliance designers is to fit all of these capabilities — physically — in the existing office. Fitting physically means that the office appliance must fit, with a printer, on a standard 40-in. typing return of a secretary's desk.

With space in New York and Washington, D.C., at $30-plus per square foot, the two-desk secretary implied by most of today's word processors simply is not realistic.

Folts is marketing vice-president of Syntrex, Inc. This article was excerpted from a speech he gave at the Interface '80 conference in Miami Beach, Fla.

I care about making USIR your most reliable source for CRT and printing terminal rental and lease.

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United States Instrument Rentals, Inc.

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A U.S. Leasing Company

FCC Supports Cut-Rate Telex

(Continued from Page 81)

on the company's application for permanent operating authority.

CCI's international telex offering provides store-and-forward delivery only, but it includes daily traffic reports at no extra cost. Messages can be transmitted to most other countries.

CCI charges $1.25/min to the UK, $1.70/min to France and $2.70/min to Japan. Customers who pay domestic access charges to the company's New York computer center receive a 25 cent/min reduction.

The IRCs, by comparison charge $2/min to the UK, $2.50/min to France and $2.78/min to Japan. Their rates are reduced 55 cent/min if the customer pays the domestic access charges.

CCI transmits telex messages overseas at 1,200- to 9,600 bit/sec; typical IRC speed, by comparison, is 50 bit/sec. As a result, the saving produced by using CCI may be even greater than a direct rate comparison indicates.

A third carrier — International Relay, Inc. (IRI) — received FCC clearance earlier to lease circuits for a reduced-rate international telex service between the U.S. and UK [CW, May 5].

That offering cannot begin for a while, however — IRI must negotiate an interconnection agreement with the British Post Office and get its tariff approved by the FCC.

IRI's proposed rate to the UK, exclusive of local access at either end of the message path, (MOR) is 75 cent/min for point-to-point (single-address) telex messages and 70 cent/min for point-to-multipoint (multiple-address) transmissions. IRI plans to transmit at 2,400 bit/sec or possibly 9,600 bit/sec.

If you were Robin Hood, we'd be your Friar Tuck.

Time after time, Friar Tuck helped Robin out of some pretty tough scrapes. And Robin came to depend on the feisty friar in a special way.

Today, Avanti has a similar reputation for dependability. In local data distribution equipment.

A case in point: our new 2200 LADD Line Driver.

It was created especially for local high-speed data distribution and performs impeccably over unloaded metallic circuits. Available with all standard interfaces, the 2200 comes in a desk-top or compact rack mount configuration, and features:

- Complete compatibility with the Bell LADS unit
- Synchronous operation with asynchronous option
- 8 selected data rates up to 64Kbps (19.2 Kbps asynchronous)
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The 2200 is Avanti's newest product. But it's by no means our only one.

In fact we make an entire family of the most advanced modems and line drivers in this business. So we can provide the exact product you need.

You might say, we're big enough to supply even your smallest needs. For the facts on our new 2200 or on our full line, write Avanti Communications Corp., Aquidneck Industrial Park, Newport, RI 02840. Or call: (401) 849-4660.

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We're always here when you need us.

System Converts Handprinting to Input Codes

WALTHAM, Mass. — A character recognition system that converts handprinted data directly into computer input codes will be available to data communications users in 1981, from Pencept, Inc.

The system, also known as Pencept, accepts uppercase printing, numerals and several standard symbols which are inscribed on a preformatted form placed on a coordinate-sensing tablet, a vendor spokesman said.

As alphabetic characters and numerals are handprinted on the form, they are reproduced on a CRT screen for immediate verification prior to computer entry.

An editing capability allows the user to add, delete or modify individual characters or complete lines of text.

Pencept is technologically different from its predecessors, known as optical character recognition OCR systems, the spokesman claimed.

OCR systems have small subsets of characters and demand uniformly drawn letters, while Pencept accepts "hundreds of different styles in uppercase lettering," he said.

Remote Job Entry

Pencept is adaptable to remote job entry functions; source data capture is its primary goal, the spokesman said.

The system will be undergoing testing at several insurance companies during the next six months because they have an ideal environment for Pencept use, he said.

Other industries he cited as possible users include banking, health care and accounting.

"Any form of operation where knowledgeable people write things on paper and put them through a keying process for computer data entry can use Pencept," he said.

The spokesman cited reduced error rate and faster turnaround time as two sources of the system's value. He said it also provides a potential for high displacement of labor costs; Pencept's research reportedly shows one company could reduce its keying and proofreading staff from 14 to four with Pencept.

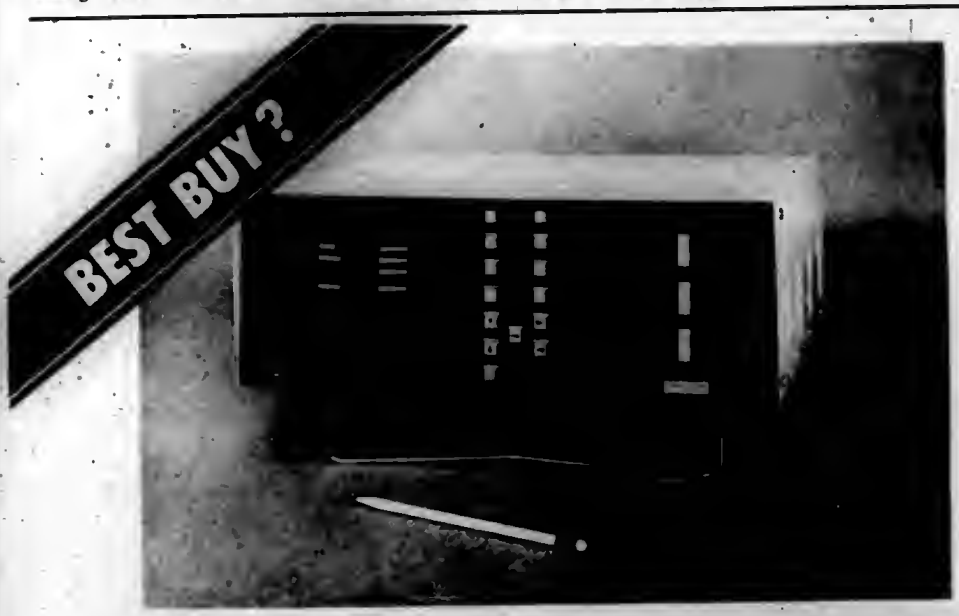
'Keyboard Reluctance'

The advent of distributed processing has led to "keyboard reluctance" among a lot of people, such as insurance underwriters, and thus increased the need for systems such as Pencept, the spokesman said. A shortage of good typists and key-to-disk operators has also increased the need.

The spokesman was uncertain about the system's eventual price, saying "we intend to go to market being competitive with today's intelligent terminal product offerings."

Much of that uncertainty stems from the fact that Pencept is experimenting with the idea of clustering writing tablets around a master terminal. The results could be a "big swing factor" in determining the final price, he said.

Pencept is at 1393 Main St., Waltham, Mass. 02154.



PRICE/PERFORMANCE BREAKTHROUGH EARNS 'BEST BUY' RATING FOR NEW DIGI-LOG DLM III DATA LINE MONITOR

'Best Buy' . . . a provocative claim that pricks the mind for proof. 'Price/Performance Breakthrough' . . . awaited news of fact? or shabby boast? Consider the facts yourself.

Before printing our claim, we checked and compared the competitive position of each one of DLM III's performance specifications (see listed highlights). We also examined the product intangibles such as lightweight portability, easy set-up via CRT guided instructions, and rugged dependability. We considered Digi-Log's seven year record as a successful data comm test equipment supplier. We then compared DLM III's low price. No other data line monitor rating approached the new DLM III for value.

A portable, self-contained DLM III is rated a Best Buy for field use because it is compact, easy-to-use, and inexpensive enough to be a practical field service tool.

DLM III even tests itself, and with the interactive option, it can simulate terminals or modems and check the line with a BERT test.

Feature Highlights	DLM III
8K Data Storage	✔
Bit and Byte Protocols	✔
Menu Set-Up	✔
Programmable Trap	✔
EIA RS 232C Breakout	✔
Speed to 19.2 kb	✔
Printer Output	✔
On Line CRC/LRC	✔
Idle Suppression	✔
Lightweight: 17 pounds	✔
Price	$2990*
Interactive Capability including BERT Test	$585

A rack-mounted DLM III is a Best Buy for central site use because it is compatible with all the modern protocols, and it offers the features you need for effective network monitoring at a far lower price. In the central site comm center, the new DLM III is an excellent companion to Digi-Log's Network Supervisory System.™

We believe there is a good chance that DLM III has the right combination of capabilities at the right price to be a Best Buy for you. If you agree, act now.

Call Digi-Log for complete specifications and demonstration. Digi-Log Systems, Inc., Network Control Division, Babylon Road, Horsham, PA 19044, (215) 672-0800.

*Single Quantity U.S. Prices

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NETWORK CONTROL DIVISION

See us at NCC show Booths 1408-1418.

AT&T Plans '83 Satellites

WASHINGTON, D.C. — AT&T recently said it will launch three new domestic communications satellites beginning in 1983. They will replace the company's present Comstar system.

The satellites, designed to operate for 10 years, will be capable of serving the contiguous 48 states, Alaska, Hawaii, Puerto Rico and the U.S. Virgin Islands. Each of the satellites will support up to 21,600 simultaneous telephone conversations.

In addition to transmitting long-distance telephone conversations, they will offer "specialized business services."

The current Comstar system has been in service since 1976.

AT&T said that it is arranging with the lessor, Comsat General, for the launch of a fourth satellite later this year or early in 1981 to ensure continued capacity on the present system until the new satellites are operational.

The present Comstar system is operated jointly with General Telephone and Electronics Corp.

PRESENTING THE MSI YOU CAN DO IT SWEEPSTAKES

Dream up an application anywhere in the world.

Choose any field that interests you—
the Economy, Energy, the Arts, Sports, Adventure, Scientific Developments, Lifestyles or any other.
Describe an application for MSI's new multi-application portable terminals—
and you can win an all-expense-paid trip-for-two to go there and DO IT!

Here's how it works. MSI wants you to become familiar with our new programmable portable terminal technology and to have fun DOING IT! MSI's new "Omega Generation" Portable Terminals are opening up dynamic new markets for Distributed Data Processing applications—from salesman order entry to cash/sales reporting to freight tracking to production-line monitoring and many more applications. MSI's program-loadable memory breakthrough has effectively transformed portable terminals into handheld computers — with complete versatility for multi-function, multi-application environments. Simply by plugging an MSI Programmer™ into the Omega Terminal, you automatically load the application program stored in the Programmer's ROMs directly into the terminal's RAM memory — just like loading a program on floppy disk into a mini-computer. Instantly, the terminal is reprogrammed to perform a totally new task.

You can do it. To be eligible to win the MSI "YOU CAN DO IT" Sweepstakes, all you have to do is send for an Official Sweepstakes Entry Form, which contains all the information you need to know to create your own program-loadable portable terminal application. Then dream up some interesting application that you'd like to do—like analyze the gold market in Hong Kong, beat the system in Monte Carlo, or track the currents of the South Seas. Whatever you design has to be feasible, though, because if you win, you're actually going to DO IT! All entries will be judged and prizes will be awarded on the basis of 1) how well your application demonstrates the full range of Omega Generation Terminal Systems capabilities, and 2) how original, creative and unique your idea is—so let your imagination soar!

Two ways to win. Actually, there are two contests in the "YOU CAN DO IT" Sweepstakes—one for end-users and one for OEMs and systems houses. You can enter either or both as many times as you wish. Both grand prize winners will be transported on an all-expense-paid trip-for-two to wherever in the world their applications specify—and both will actually DO IT!

Prizes for everyone. One hundred second prizes will be divided between the two contests — each of these runner-ups will receive an Autopulse™ programmable automatic dialing machine with 30 reprogrammable phone numbers. And everybody who enters will get his or her own multi-function "YOU CAN DO IT!" penknife-keyring. You can't lose—you CAN do it—so enter now!

Enter Now. Mail this coupon today for your Official "YOU CAN DO IT" Sweepstakes Entry Form—or pick up your Form and some applications development advice from MSI's tradeshow booths at Food Marketing Institute in Dallas or National Computer Conference in Anaheim. But hurry—all entries must be postmarked NO LATER THAN MIDNIGHT, JUNE 30, 1980!

Name _____ Title _____

Company _____

Address _____

City/State _____/_____ Zip _____

Please send me my Official MSI "YOU CAN DO IT" Sweepstakes Entry Form for

☐ End-User ☐ OEM ☐ Both

MAIL THIS COUPON TO: Robert J. Mobilia, Sweepstakes Coordinator,
MSI Data Corporation, 340 Fischer Avenue, Costa Mesa, CA 92626

To be eligible, entries must be postmarked by June 30, 1980 and received by July 7, 1980. Sweepstakes open only to residents of the U.S.A. excluding employees of MSI Data Corporation and its advertising and promotional agencies and their families. Sweepstakes are subject to all Federal, State and Local regulations; void where prohibited by law. MSI is the sole judge of appropriateness and quality of all entries. All decisions are final. All entries and ideas therein become the property of MSI Data Corporation.

MSI DATA CORPORATION

THE LEADER IN PORTABLE DATA TERMINALS

Terminal From ITT Courier Compatible With IBM 3278

TEMPE, Ariz. — An IBM 3278-compatible CRT terminal from ITT Courier reportedly goes IBM one better by offering as standard either a typewriter-style or data entry keyboard. A typewriter-style keyboard with 24 program function keys is optional.

The C278 plugs into any mainframe or terminal controller that supports the IBM 3278, including the 3274 and 3276 controllers and 4331 CPU. Like the 3278, it comes in four screen sizes ranging from 960 char. to 3,440 char.

Features include a high-speed cursor for programming and data entry tasks and a variable field underline to show the number of spaces available in unprotected fields.

The C278 adds more features not standard on the IBM 3278, such as a nonglare screen and a mode to facilitate debugging, Courier said.

The C278 costs 30% to 40% less than its IBM counterparts and leases for 20% less, the vendor claimed. A C278 with keyboard costs approximately $1,900 and leases for $70/mo on a one-year term and $50/mo on a five-year term.

ITT Courier, a unit of International Telephone & Telegraph Co. is located at 1515 W. 14th St., Tempe, Ariz. 85281.

N.Y.C. Firm Says It Can Fix 3101 In Three Hours

NEW YORK — Users of the IBM 3101 terminal may be interested in a three-hour guaranteed service plan from Technical Data Corp. — if they live within 75 miles of this city.

Model 3101 users are encouraged by IBM to diagnose problems with their terminals and to mail the faulty parts to IBM for repairs. Even if an engineer is called in, he is authorized only to determine what part is malfunctioning; the user still is required to return it for service.

Technical Data, on the other hand, offers to drive to the user site and have the 3101 working within three hours of the call for service, either charging about $25/hour — $51 less per hour than IBM — or working on a contract basis for those operations with five or more terminals.

"If a customer wants somebody to hold hands when terminal problems are encountered, we provide a less costly and quicker alternative," a spokesman asserted.

Technical Data is located at 152 W. 42 St., New York, N.Y. 10036.

Newsletter Out For Managers

BOSTON — "Trends in Communication Management," a monthly newsletter, is available from Economics and Technology, Inc. (ETI) for a $48 annual subscription.

The newsletter is aimed at telecommunications managers and will include user case studies.

ETI is at 101 Tremont St., Boston, Mass. 02108.

Series/1 Polling Supported

ANAHEIM, Calif. — Cantlin Communications has introduced a polling package designed for data collection over dial-up telephone lines by users of the IBM Series/1 minicomputer running under the EDX operating system.

The package includes a data collection program, phone number file maintenance and a polling report that lists the numbers both successfully and unsuccessfully polled.

The data collection program receives data over asynchronous lines using 8-bit data interchange code. It works with an eight-line controller and four line adapters or a single line attachment.

The package can be modified to use bisynchronous instead of a synchronous communications. Moreover, Cantlin can customize the programs to customer requirements and run tests using any phone numbers.

Raw data can be stored on disk, diskette, tape or transmitted to the host CPU.

The package costs $4,000 including customization to nearly any asynchronous protocol. Custom data formatting, as well as extra reports, are optionally available.

In addition, a complete set of data formatting programs and a large variety of extra reports are available for Fasfax systems, Cantlin said from 11532 Poes St., Anaheim, Calif. 92804.

The PDS 270 .....

Announcing Our Latest Addition
to Coordinated Network Architecture

On-Line Network Encryption System Debuts

ANNANDALE, Va. — An encryption system that reportedly requires neither distribution of master encryption keys nor downloading of working keys from host to remote sites has been announced by Advanced Computer Security Concepts.

The system, for which a patent is pending, is applicable to proprietary, shared and interchange networks, the firm said. Using secret and nonsecret information at remote sites, the system:

• Generates a working key that is used to encipher a message. That encipherment generates another working key using the masterkey and additional information available at the remote site.

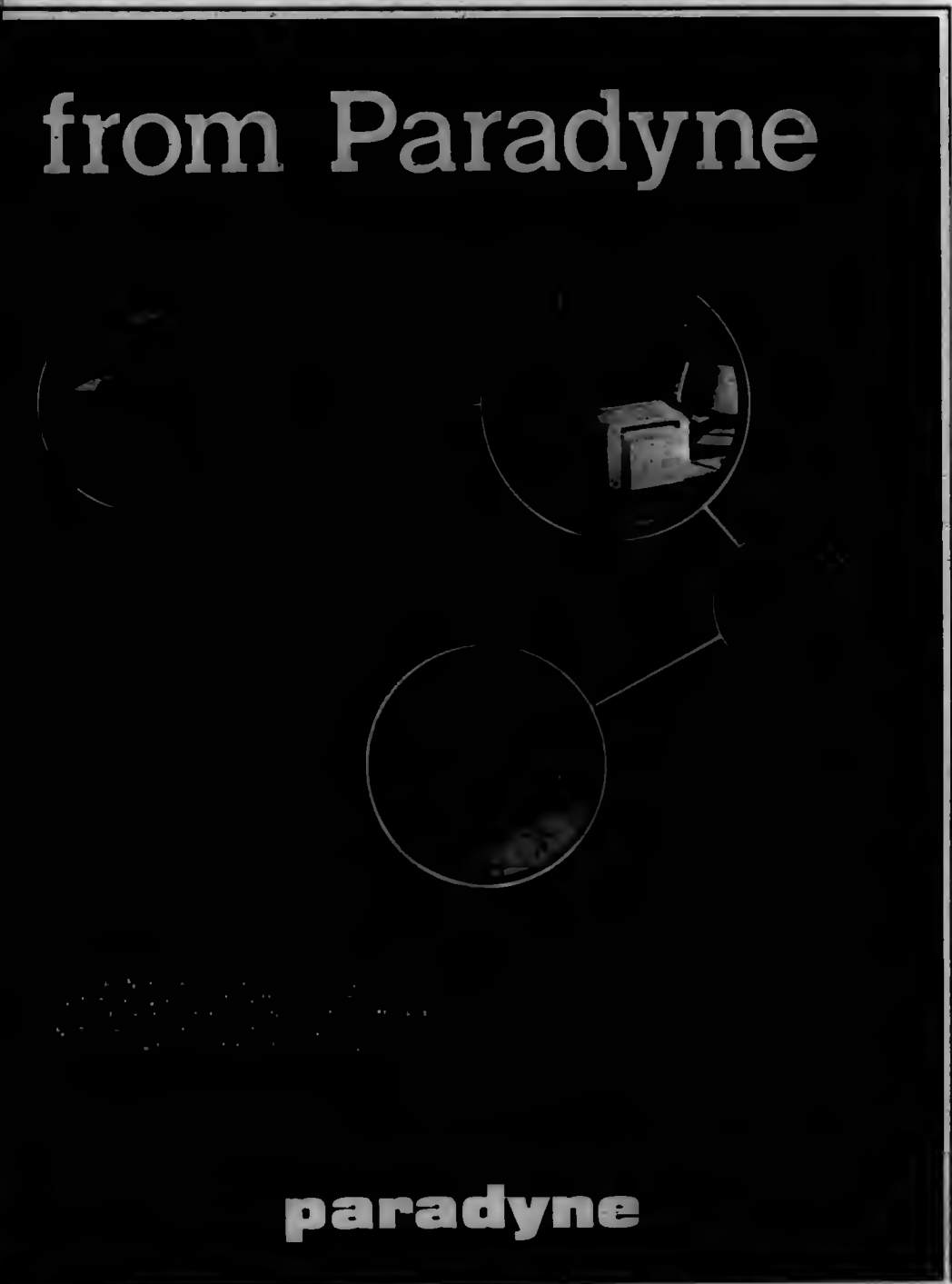
• Generates a "transmitted key" that reverses the process by indirectly using the working key plus other information transmitted with the message and used at the central site. It also requires "some secret and nonsecret information that is available from the central site," the firm explained.

In the reversal process, the master key is also used at the central site.

Secret information such as personal identification numbers or working keys are never transmitted, but are included in the transaction request "by implication." An intruder who obtains a deciphered message, therefore, cannot obtain any information that will compromise the system or even the account that is referenced in the deciphered message, a spokesman said.

In addition to providing protection of personal identification numbers and eliminating the need for taking up line time to distribute working keys to remote sites, the Advanced Computer Security system is further distinguished from other offerings. It provides a unique working key for each transaction, end-to-end encryption and authentication of the person initiating the transaction as well as the terminal from which the transaction was initiated, the firm said.

The encryption system is compatible with the Federal Data Encryption Standard. Its price varies with the application, Advanced Computer Security said from 4609 Logsdon Drive, Annandale, Va. 22003.



Unit Handles 1,200 Bit/Sec Voice, Data

BOONTON, N.J. — Voice plus 1,200 bit/sec full-duplex data transmission over a four-wire circuit can reportedly be obtained with the RFL Industries, Inc. Model 6860 communications processor.

Speech plus digital communications were limited to 600 bit/sec speeds prior to the Model 6860's introduction, the firm claimed. The processor uses a voice compandor for greater intelligibility than possible with other systems, according to the firm, and includes input and output signaling to interface between PBX and PABX terminals.

Digital interfaces include either RS232C or CCITT V. 24 through a 25-pin connector. The vendor specified data distortion of less than 1%, a modem loop-back switch and supervisory LED displays of the unit's digital functions.

The processor costs $3,264, RFL said from Powerville Road, Boonton, N.J. 07005.

HP Brings Out Fiber-Optic Link For 1,000 Meters

PALO ALTO, Calif. — A fiber-optic transmitter that can transmit digital data over 1,000 meters is available from Hewlett-Packard Co.

The HFBR-1002 is an integrated electrical-to-optical transducer designed for transmissions over single fiber-optic channels at rates from dc to 10M bit/sec. One-thousand-meter performance at maximum speed is guaranteed when the HFBR-3000 series cable and connector assembly.

The HFBR-1002 costs $350 and fiber-optic cable costs $2/meter. Connector installation is $45/termination. The HFBR-2001 receiver costs $225, according to HP at 1507 Page Mill Road, Palo Alto, Calif. 94304.

Limitations of Home Satellite TV Nets Explored

By Fred Hopengarten
Special to CW

The time has come to inject realism into discussions of home satellite TV as a medium for data communications.

Frankly, it is not clear what size satellite dish will be required for home data communications systems. Despite deep interest in applying radar antenna techniques, the most practical method of developing sufficient gain at microwave frequencies is still found in employing parabolic dish antennas, which offer high gain and a narrow beamwidth.

Analysis

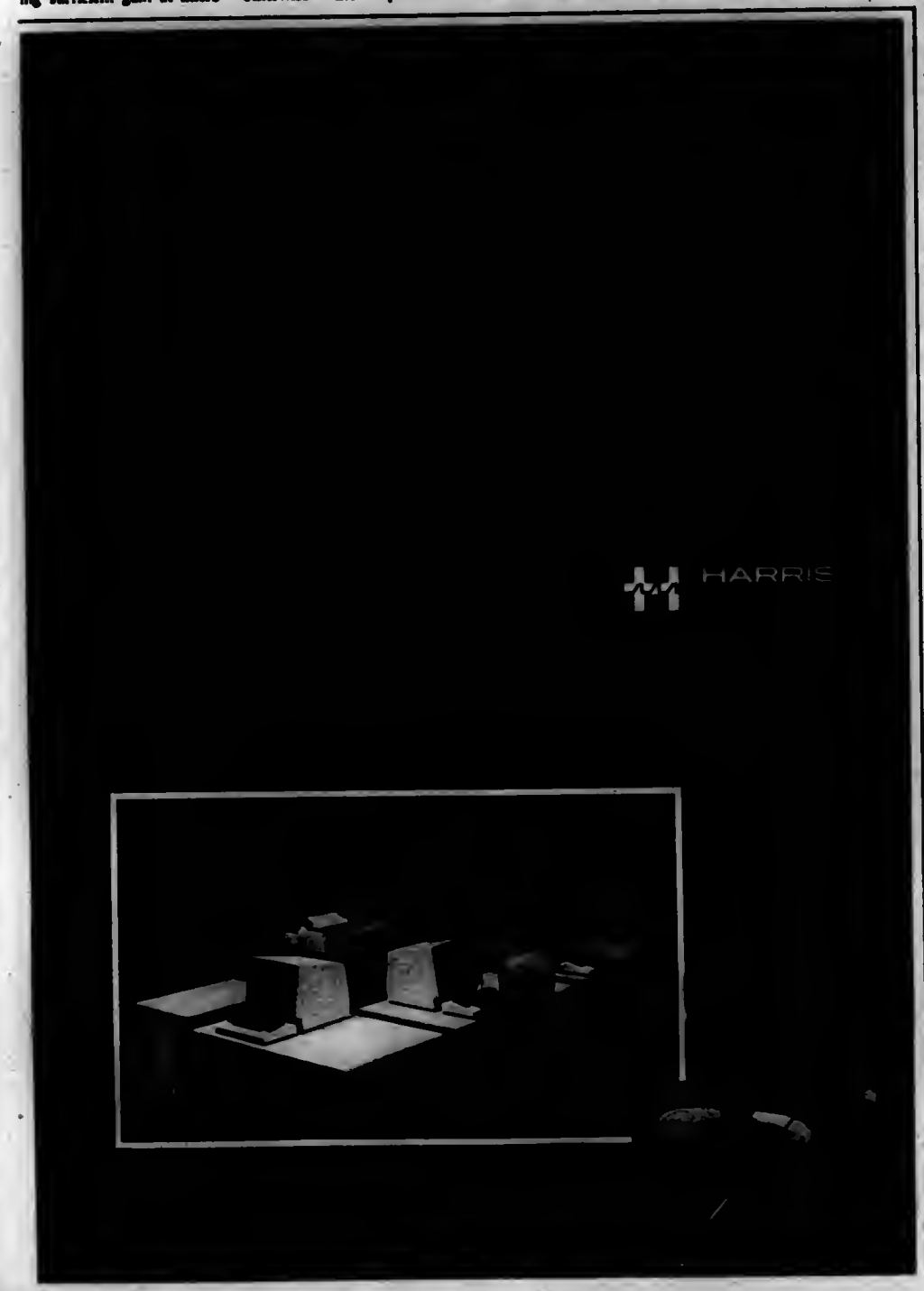
The narrow beamwidth is necessary to distinguish between satellites that share the same frequency allocation; otherwise the spacecraft would interfere with each other's functions.

As a case in point, my company — Channel One, Inc., a retailer of home satellite TV systems — employs 5-meter dishes for installations on the East and West Coast and the Southern Tier.

The antenna weighs about 2,000 lb, including mount, base and feed. In a 90 mile/hour wind, it develops a moment of 4,000 lb. of downward weight and looks like a big sail out to capture the wind.

The roof of many home users may either cave in or rip off under such pressures.

On commercial buildings, condominiums and apartment buildings, we require a plan by a registered professional engineer before we will agree to do the installation. Even then, finding the right crane is no easy task.



Are smaller dishes the answer? Yes, if the frequency is right. At a transmission speed of 12gHz, you will get the same gain (increase in signal power) with a dish one-fourth the size of ours. But mountings will still need to be sturdy enough to keep the dish aimed at precisely the right point in a stiff wind.

All that gain is at the expense of beamwidth, remember. Unlike even the typical subscription TV antenna, the dish will probably have a beamwidth in the range of 1° to 1.5° — meaning it will not function correctly if its aim veers off the mark by that much.

Hence, home data communications will have to be small and will require secure mounting and accurate aiming. Installation will not be cheap.

Trees and Buildings

We are discussing geostationary satellites. This means that they will "park" in one spot — synchronized to the earth's rotation — and serve a wide area. Everyone will have a slightly different view of the satellite; someone will always be looking low to the horizon.

For example, from my home in Lincoln, Mass., the "look" at RCA's Satcom F1 satellite is at an azimuth of 252° and an elevation of 10° above the horizon.

That means a meager 40-ft tree must be 240 ft away before I can clear it. No wonder that some of the most creative microwave engineering is done with a chain saw.

Exactly one-half of all people who live on hills, live on the north side. All geostationary satellites are found in the south-to-west quadrant. Therefore, the terrain itself, even if bereft of buildings and trees, may get in the way.

Cable TV vendors commonly take the view that they will soon have half the nation wired for cable TV. Sometimes they claim to offer all sorts of satellite data communications services.

If the cable vendors can really deliver those services, more homes will be passed by cable and fewer homes will want earth stations for satellite communications.

Hopengarten is president of Channel One, Inc., located at 68 Avalon Road, Newton, Mass. 02165.

Correction

The Model 736 printer from Interface Systems, Inc. of Ann Arbor, Mich., features a Courier 72 type font, according to the vendor. It therefore is not a matrix printer, as erroneously stated in this section last month [CW, April 14].

INTERVIEW WITH PETER DRUCKER

Management, Computers And the Information Economy

Have computers changed the way managers manage?

Not at all, so far. They have changed the way a warehouseman runs his warehouse, but for top management? No. Partly because what the computer considers information is marginal for top management decisions and partly because very little top management is basically structured.

There are exceptions, but they are exceptions in terms of specific decisions, such as where to set up a manufacturing plant. When it comes to middle management — operating middle management — access to information has made a very great difference in the way they operate, but almost no difference for top management.

A very few, mostly large companies, have been working on systematic strategy for 20 years; it takes that long, and then you can use the computer.

But the idea that so many have, that you can use the computer in lieu of a [logical] system, just doesn't work.

Some firms either don't have a model [to put on their computer], or if they do have a model it is so unspeakably primitive that it lets them down, so the impact of the computer has been very small, and it has been greatest in those operating areas where models have existed all along — to build a bridge, for example.

How are managers failing to make the best use of computers?

They don't think through this question: "What information do I need?" They expect the computer specialist to know that.

But they're learning, and very fast. I think we are past the worst stage of computer constipation, where everyone has five million computer printouts lying in the corner and feels guilty because they can't use them.

But the stage where people begin to ask, "What information do I need? What is relevant? And in what format?" is not really here yet. It's beginning. Managers expect computer specialists to do that, and the computer specialists in turn tend to be very conventional — "I do inventory or accounts payable or credit . . ."

Computer specialists are only now beginning to ask "What do you need?" But that's changing rapidly.

What is the effect on managers of having more information available instantly?

At first they get sick. Like the little boy in the candy store, they stuff themselves. Then they misuse it. They have to learn.

One of the things that is shocking to realize is that not only is learning slow, but that it always follows the same curve.

However, the greatest impact of the computer has been not in supplying information but in replacing misfits. For example, [there is an ophthamological procedure that involves] mapping the eye [that involves a great deal of tedious work]. That is about as donkeyish a job as you can find, yet it requires high precision and a good deal of judgment. Ophthamologists hated to do it, and their assistants were slipshod. That has been automated. Man is not good at doing routine work that requires judgment.

Some top executives have CRT terminals in their offices. Does the typical chief officer need one?

I know plenty of people in business or government who refuse to have a computer terminal in their office and who never go out to the field to collect information; they rely on written reports.

[However], a display unit or terminal is going to be as much a standard office accessory tomorrow as the telephone.

[However, it is also true that] there are lots of CEOs who will never allow a telephone to show in their office — it's there, but it's hidden. This is much more common in Europe where there are sometimes baronial office suites, much like a castle. The idea is to make the office look ornate, and the telephone is a crude reminder of business. On the other hand, there are people like myself [who after] half an hour without a telephone get withdrawal symptoms.

I think you'll find terminals [becoming more and more common], especially as the things get smaller and smaller. Ten years from now I don't think terminals will be much larger than a [reporter's cassette recorder].

We assume you're aware of electronic mail . . .

I'm also aware of the fact that our post office, in typical post office fashion, is tackling the wrong part of the job. Once your letter has been sorted in the post office at Logan Airport in Boston, getting it to the Los Angeles Airport costs neither time nor money.

The expensive thing is getting it from the corner post box to Logan Airport, and then getting it from the Los

(Continued on In Depth/2)

CW Photos by J. Whitmarsh

Peter F. Drucker is an internationally recognized management consultant, ex-newspaperman, author, college professor, Wall Street Journal columnist, mountaineer, hiker and star of management training films.

Drucker, who has just written his 16th book in 41 years (Managing in Turbulent Times, New York: Harper & Row, 239 pp., $9.95), is by any reasonable standard "a modern renaissance man," according to free-lance computer journalist Howard Karten, who conducted this interview for Computerworld.

"I'm supposed to be the only person who ever turned down four offers from Harvard," recalled Drucker, who lacks an undergraduate degree but earned a doctorate in public and international law.

At 71, Drucker has taught management, economics, politics, history, philosophy and Japanese art history. He is currently a professor of social science at Claremont Graduate School, Claremont, Calif.

Despite his teaching credentials, Drucker does not consider himself an academician. "I've never felt comfortable with academia, nor has it felt comfortable with me. I'm not respectable academically," he said.

"I'm not a businessman either. I've never run a business, and I know nothing about it in that sense," he added matter of factly. Though he moves in the centers of power, Drucker belies the popular image of high-browed consultants. He is quick-witted, warm, friendly and courteous. In conversation he is by turns serious, playful and earthy.

At home in topics from chemistry to computer science, Drucker confides that he would like to learn Japanese but is simply lazy. He has, however, taught himself Basic, Fortran and Cobol.

IN DEPTH

'. . . Information, by definition, is as homeless as money — and as unpatriotic and as freeflowing. So the traditional concept of national boundaries [as far as information is concerned] is just another denial of the sovereign state concept.'

(Continued from In Depth/1)

Angeles Airport to me. That the post office proposes to keep doing the old way because if you do it the intelligent way, there is no post office.

Transmitting graphics by putting ink on paper and then carrying that cellulose long distances is simply no longer defensible. Everybody has in his home two perfect printing machines, the telephone and the television. In fact, the color TV is a better printing plant than most commercial printers have. The only sensible way to send information is electronically. We'll still use cellulose, but we won't transport it.

The electronic mail concept [being proposed by the U.S. Postal Service] is a typical post office way of saving the totally obsolete, which is hand-carrying, -delivering and -sorting. The need exceeds the available manpower.

It's similar to the situation that existed in the Bell System in 1911 when Mother Bell began to wonder how many operators would be needed to handle the entire volume [which estimates indicated would exceed the population].

So the post office is going to be put out of its misery. It is not capable, politically or intellectually, of tackling the job. It cannot imagine eliminating the mail. The concept of mail is totally obsolete; it's communications, and that is something the post office cannot do. Plus the fact that politically the post office is dedicated to saving so many carriers' jobs and nowhere more so than in this country, where the post office is now the largest single employer of low-skill minorities.

So I think, in 30 years, forget the post office. We are going to keep it alive as a welfare institution.

[In his latest book, *Managing in Turbulent Times*, Drucker writes: "Few companies that installed computers to reduce the employment of clerks have realized their expectations; most computer users have found that they now need even more, and more expensive, clerks even though they call them 'operators' or 'programmers.' Similarly, the old fears that 'automation' would result in large-scale unemployment have been disproven; all automation might do is to shift employment from fairly low-paid manual to much more highly paid technical or professional work."]

More and more, the U.S. is becoming an information economy in which we produce less goods than information. Do you see any danger in that?

Yes, clearly; not in the coming information economy, but in losing the capacity to make things. With our demographics we cannot make things the traditional way.

That, by the way, is why I think the miniprocessor is so important. It largely makes your question obsolete, since the question assumes an incompatibility or difference between the information economy and the goods economy. The miniprocessor brings the two together again and makes possible genuine automation.

Does the shift to an information-based economy mean we have lost other abilities, for example, to produce food or repair a car? And what are the implications of this for a complexly interconnected society like ours in the event of a nuclear war?

It's doubtful that we have [really] lost our other abilities. On the other hand, information systems are far more easily restored than physical systems. Everyone says China is immune to nuclear war because they have no big city centers as we have. But if China loses the capacity to transport rice, many more people die. The Chinese are still totally dependent on a precarious transportation system.

Probably a much larger proportion of our population lives within the radius of a nuclear blast, but on the other hand, far fewer are dependent on a physical system that, once broken down and in the absence of information, is impossible to repair. We have [also] an information *redundancy*.

The amount of transborder data flow is increasing, but some countries are trying to impose tariffs on these operations. Where will this lead?

There are two related problems, one inside and the other outside.

On the inside, let's [hypothesize] that every manager will have a miniprocessor on his desk. The manager will have to think through what he needs, which he doesn't know. And he will have to think through how to maintain both the freedom of information flow and the needed privacy and secrecy.

Then you have the fact that information, by definition, is as homeless as money — and as unpatriotic and as freeflowing. So the traditional concept of national boundaries [as far as information is concerned] is just another denial of the sovereign state concept. The modern state has lost its fundamental rationale, first because its first job was to defend its territory and defense means to protect civilians against attack. Secondly, there is the [old] assertion that economy and political territory are congruent, are one and the same.

Both these ideas make no sense anymore. In that sense, information is just a minor element in the crisis of the national state. A much greater threat than the computer to the national state is the emergence, or reemergence, of a universal language. The fact that, for example, a Swiss company conducts its business worldwide in English is far more of an assertion of a supra- or transnational reality than the computer.

What is the Soviet Union going to do when there is direct satellite transmission to individual homes? How will they be able to keep that out? They have never been able to keep out the Voice of America or the BBC. These are tremendous threats to a regime that

IN DEPTH

exaggerates the amount of [threat to it].

Fundamentally, the national state, conceived as the ultimate sovereign, is totally incompatible with economic reality, with electronic reality. TV is a much greater dissolver of national boundaries than data flow.

Turning to a different area of conflict, can you foresee what will happen in the current IBM trial?

The one absolute sign that ascendancy is over in monopoly or advantaged positions is an antitrust suit. Antitrust is an unbroken record of bringing suit after the event. The first IBM trial, over the punch card, was begun in 1952 and settled in 1956. The present suit indicates only that IBM's heyday is over.

And incidentally, it is probably irrelevant. Breaking up IBM would be the best thing to happen to IBM. IBM may very soon become its own worst enemy; one cannot maintain a monopoly like IBM.

[In his latest book, Drucker says: "Large organizations successful in yesterday's technologies tend to be defensive rather than offensive." Shortly after that, he writes these telling lines: "But IBM, largely because it was not unencumbered by the past, became the leader in the computer field."]

I have great respect for IBM. I think they are very good people. But IBM is being forced to defend the great mainframe, which is becoming minor in the same way that the electric turbine became an adjunct to electric power. With General Electric [the money and the business shifted to other areas such as refrigerators, light bulbs and toasters], and I suspect GE makes more money from toasters than from turbines and has for a long time.

The future is not in mainframe computers, nor is the money. Mainframe computers, I think, have ceased to be profitable. Nor can anyone maintain a 60% world position on a basic resource. So IBM is bound to lose ground, but can they redirect their energies the way GE succeeded in doing? I think this suit indicates IBM's leadership position is over, and maybe that is good for IBM.

The suit itself is without merit because what IBM is being accused of is the incompetence of the others. IBM's great crime is not that it was a monopolist or even that it was particularly bright, but only that the others were so incompetent.

So the government is only too eager to settle. [The government] brought suit in the expectation that IBM would scare, as it did in 1952. Fortunately, by that time the punch card wasn't very important to IBM any more, and the Justice Department, I'm sure, just assumed that IBM would cave in for the sake of peace and settle.

IBM had also learned something — that one doesn't cave in. The moment IBM dug in its heels and said "We'll fight," the government had lost its case — it had no case! The government since then has simply been trying to get IBM to the point where IBM gets so weary that it says "All right, we'll settle, we give in." So [there have been] more fishing expeditions, more documents, making it not only more expensive for IBM but, above all, forcing more and more IBM executives to spend time on that nonsense, which is the greatest burden.

The government is just trying to wear IBM out, and so far IBM has shown amazing guts in saying "All right, this is more than a nuisance, but we'll fight." On that basis, the government has absolutely no case.

The case has been five years in trial, but the government cannot possibly win. The government now [in effect] is actually willing to settle for two cents on the dollar, and I am not yet convinced that IBM is willing to pay more than one cent on the dollar. If I were IBM now, I would not make any concession.

What about IBM's future?

IBM's capacity to survive may well depend on its ability to do things that IBM has always traditionally refused to do — joint ventures and so on. And then it becomes highly desirable to have your technology in a different basket, so that if you go into a joint venture you don't give up your basic technology.

[But] those people in Armonk are much brighter than I am, and they have been through this pretty carefully. Though I'm not sure they realize, or are willing to accept, that they have made information into a central position and therefore have made their own leadership untenable, politically and economically.

Do you see computers as a fundamental threat to privacy?

Yes. Fundamentally, you have the problem you always had with any central file. In that sense, the phone book is a threat to privacy — and also to secrecy. If you want to see the inside of a Russian jail, put a phone book in your briefcase when you leave Moscow.

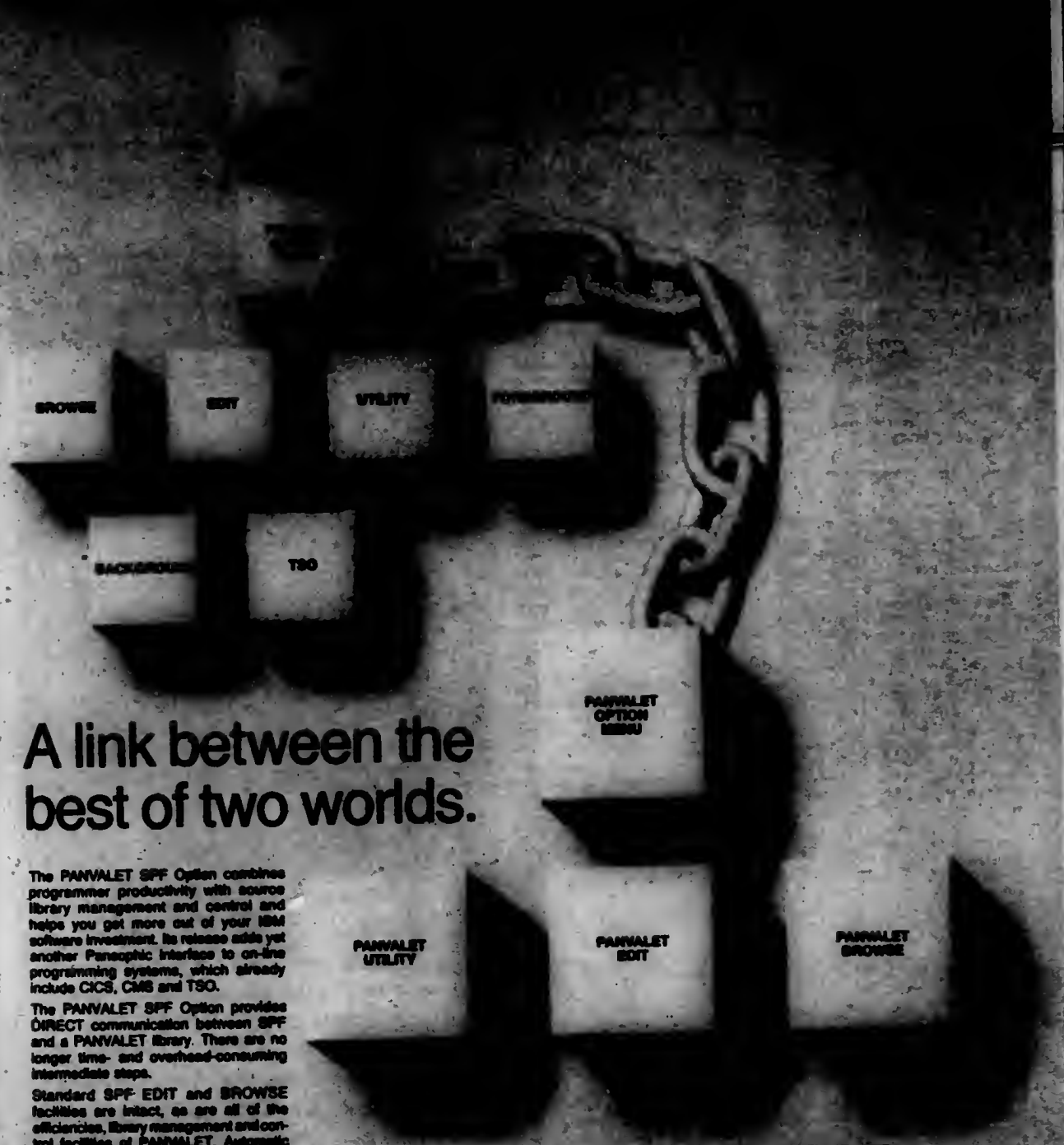
The phone can be used to invade privacy, too — such as with obscene phone calls. Any central file is a threat. Partly [though], the very mass of information is a protection; since there are 80 million phones in this country, the odds of getting a [random] obscene phone call are small.

In *Management: Tasks, Responsibilities, Practices*, you wrote that "the growth of middle management jobs has been parallel to computer usage." Is that trend continuing?

Yes, it's happening even faster now [than in 1973, when the book was written].

Computer usage in part is driving that growth, but that is only one factor. The other is that you have to use available manpower. The volume of work has forced us to systematize.

'The [government antitrust suit against IBM] is without merit because what IBM is being accused of is the incompetence of the others. IBM's great crime is not that it was a monopolist or even that it was particularly bright, but only that the others were so incompetent.'



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IN DEPTH

SHUTDOWN!

Ordered to disband by 1985, the Civil Aeronautics Board installed a DBMS to ease the phaseout of the agency while providing a "clean slate" upon which "heuristic" implementations could be written. Here's how the CAB planned for its final years.

When the Airline Deregulation Act of 1978 ordered the Civil Aeronautics Board (CAB) to disband itself by 1985, the CAB became the first major U.S. government agency in history to fold up its tent poles and steal off into the sunset.

Planning for an orderly shutdown of the CAB began in 1978. As management reviewed the work ahead, one particular problem loomed menacingly on the horizon. The problem was manpower.

As the future of the board became less secure, an increase in employee attrition could be expected. Approval for filling vacancies would be harder to secure through Civil Service, and replacements for those approvals granted would be more difficult to recruit. Those new souls who *were* recruited would not be granted the luxury of adequate training time, nor would those qualified people remaining be apt to have time to train them.

Other problems had to be faced. Additional tasks would be added to the already burgeoning workload as Congress added milestones for closing on top of existing work. These additional tasks would increase the workload — with fewer people — and would worsen the working conditions. That would cause even more attrition and further increase the workload, and a deadly spiral would begin.

Despite the order to disband, the CAB in 1978 decided to implement a data base management system (DBMS) in order to provide the support and skill for the board's programs even as people carried their expertise to greener pastures.

DBMS are considered the ultimate in software. Unfortunately, they have had a history of being difficult to select and install. As the data base administrator (DBA), hired in March 1978, I was to ensure that the problems of selection and installation were minimal.

Six-Point Plan

Selection and installation were based on a six-point plan consisting of the following steps:

1) Introducing the concept and getting management support in the form of commitment.

2) Conducting a user needs analysis to produce a description of absolute, not theoretical, requirements.

3) Collecting data from vendors.

4) Comparing data from vendors with the results of the user needs analysis. When necessary, we return to step 3 to collect missing data. The object was to avoid comparison *between* vendors.

5) Eliminating those vendors that did not meet requirements.

6) Selecting the vendor that most completely satisfied weighted requirements with fewest problems.

Environment Defined

During the first three months of this process, from March to May 1978, the DBA defined the environment in which the DBMS would exist. As it turned out, the environment would remain pretty much as it had been. Although hardware could be increased somewhat, the CAB's IBM 370/155 with 2M bytes of memory, 3330-XI disks, 1,600 bit/in. tapes and 3270-type terminals would have to suffice. The new DBMS would have to live in harmony with existing systems and cause relatively little interference.

No increase in our two dozen personnel would be allowed. And while DBA support would come from applications areas, we would be authorized no more than the two systems programmers on board. Communications would continue to be handled by IBM's Customer Information Control System (CICS), with Applied Data Research, Inc.'s Roscoe providing the on-line/batch submission interface.

In addition, no programming activity other than "laundering" requirements could be tolerated. The DBMS would have to come with a full set of tools — as automatic as possible.

Most important, the DBA determined that applications would be delivered within one week of specification. This included time for design, development, installation and even training. Furthermore, the applications would be turned over to the users' complete control when done. They would take the responsibility for integrity, troubleshooting and ad hoc reports. With attrition hitting the programmers as well as other shops, skilled time would be at a premium.

As with most shops, there was a considerable delay between the time a user determined the need for a system and its delivery. The best average was between a two-week and six-month lag. Once the project had begun, the number of problems was in direct relation to the time spent. The longer a project took, the more trouble it became. This observation gave inspiration to a ridiculous solution: Decrease the time, and decrease the troubles.

'Clean Slate'

Again typifying the rule, there were no standards. Period. Structured programming? No. Development teams? No. But there was a challenge here. There was a chance that the CAB was a "clean slate" and that the absence of traditional methods could increase the chances for a radically new concept to succeed.

With a 1985 deadline and only a dozen programmers, few applications could be written from scratch before the lights went out. To get the measure of what turnaround was required, the number of *expected* tasks for the last six months was estimated and matched against the number of "free" programmers. The need for a one-week turnaround appeared.

The requirements list continued with a description of every feature that a DBMS possessed or claimed — and a few that were completely off the wall. The result of this effort was a user need analysis; it described the DBMS that would fill every need of the CAB.

The requirements analysis took almost three months, from March to May. During this time, information on 18 past applications was gathered, including their "relative success" and how they would react to a DBMS environment. Each application was also categorized as to the user's requirements and how much drain it would place on the system. Thus, a general picture of the utilization of the DBMS was drawn, and it included three broad strokes:

- Industry data submitted to the CAB would require periodic aging and frequent ad hoc retrieval.
- Applications originating within the CAB to serve its charter would need on-line access for retrieval and updating.
- Internal tasks would monitor the resources of the CAB and automate the requirements imposed by the Sunset Act.

Frequently, requests involved data from several applications and spanned the classifications. Industry analysts seemed to take great pleasure in turning a simple listing into a modeling task, asking complex "if, then what if" questions at every opportunity. There would be a certain justice in allowing them to handle their own requests.

Unique Systems

Since there were no standards, there could be no similarity expected between systems. However, the DBA developed a dictionary and ran source code through it. Sure enough, each system was as unique unto itself as if each had been written on a different planet.

When a choice is available, the traditional selection of any product has been the equivalent of shutting the salesmen together in a closed room with sharp knives and awaiting the emergence of the winner.

With so much at risk, the CAB elected not to play the game by those rules. Seven vendors were considered as meeting the most basic requirements. Each would be evaluated against the "ideal" DBMS — nicknamed Belchfire — and the one coming closest

(Continued on In Depth/6)

By Daniel A. Nolan

IN DEPTH

CAR STANDARD WEIGHTS

SYSTEM:		CODE
ONLINE QUERY - INTEGRATED	5	OLQ
REPORT WRITER - INTEGRATED - COBOL LANGUAGE	3	RW
PROGRAM INTERFACE - COBOL LANGUAGE	3	PI
DEFINITION LANGUAGE	1	DL
INTEGRATED DIRECTORY - VALIDATION - SECURITY	3	ID
DATA INTEGRITY	5	DI
DATA DICTIONARY - INTEGRATED - TARGET/SOURCE	4	DD
UTILITY LOAD	4	UL
AUTOMATIC FILE MANAGEMENT	5	AFM
DOCUMENTATION	2	D
TRAINING	2 72	T

Figure 1

GOOD CRT'S COME IN SMALL PACKAGES

Who says a CRT terminal has to be big and bulky to do a good job? At Ann Arbor Terminals, we offer a full 15-inch screen *and* detached keyboard as standard on all our desktop terminals. And the case is only 14" wide by 15" high by 13.6" deep. We're known throughout the industry for our high quality and reliability. On top of this, we probably have the widest range of available options in the field. Display formats from 256 to 4000 characters. Foreign language character sets. Special command sets. Custom keyboards. Editing, protected fields and block transmit.

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Tel: (313)663-8000. TWX: 810-223-6033.

ANN ARBOR

(Continued from In Depth/5)

would be selected.

All major DBMS vendors had been contacted, but only the final seven met our requirements of machine environment and capabilities. When the detailed selection began in June 1978, each vendor was surprised that we knew what we wanted.

The seven candidates were Cincom Systems, Inc's., Total, Cullinane Corp.'s IDMS, IBM's IMS, MRI Systems Corp.'s System 2000, Computer Corporation of America's (CCA) Model 204, Software AG's Adabas and Infodata Systems, Inc.'s Inquire.

Portrait of 'Belchfire'

"Belchfire" had the following characteristics:

- A simple data definition language (DDL) that would permit rapid file descriptions.
- An automatic load feature that would require nothing more than the DDL to load data from scratch into the data base.
- The ability to plug Cobol directly into the load to select records and launder data.
- Absolute security against data getting into the data base in a form other then described (by the DDL) — that is, no alphas in numeric — which could not possibly be overridden.
- An integrated data dictionary which "fed" off the DDL and, in turn, supplied the accessing programs and queries with field characteristics.
- Freedom from reorganization.
- The ability to change a file description without physically touching the data.
- The ability to present different "user views" of the same data.
- The ability to decode or expand encoded values to their English names.
- A query language that used the names from the dictionary (the DDL, remember) in a common Prose syntax and could operate on-line or batch. An in-line compiler checking the query against the data characteristics (dictionary, again) was required, as was the ability to "store" requests for later recall.
- An internal programming language sharing the character of the query, but with the ability to store and manipulate data.
- No dependence on "call" subroutines or outside programs written in Cobol or another language (which would be outside the realm of the dictionary).
- Security measures which would exclude access by file, by field within file or by value of field in a record. Think about it.
- Automatic recovery governed strictly by the internal programming language. (Since the language was supposed to be so smart, there would be no abends to contend with, would there?)

Clear Descriptions

Each feature was described in clear and concise terms. A vendor's claim of having an integrated data dictionary was not good enough if it did not do the job.

As a final condition of sale, six of our most important applications were targeted for installation. The DBMS vendor would be expected to install all six (true nasties) and to train the users, all within two weeks immediately following purchase. The final requirement caused three of the seven candidates to immediately excuse themselves.

We did not consider this last requirement a capricious one. Each vendor was prepared to install its demonstration data — students and classes or people and automobiles — but the objectives we sold to management were real.

Of course, some amount of hedging was possible. The six applications were already chosen, and there would be an interval for preparation of less than a month between the decision to buy and the actual purchase. One person from systems and the DBA would perform the installation with technical support from the vendor, while six programmers (one for each application) would concentrate on the data loading.

We presented our requirements and definition to top management in June. We were at first encouraged, then told to be more realistic and finally advised to forget about a DBMS altogether. Choosing to be encouraged, we set about investigating the products in the marketplace.

Rating Scheme

Since the selection was to be based on which of the DBMS packages most closely met the "Belchfire" standards, we had to cut through the marketing horseradish and get a firm idea of the capability of each system. Simply claiming to have a certain feature, such as an integrated dictionary or intelligent load, would not suffice. Each feature of every product had to be evaluated.

To do this, we rated the characteristics of the Belchfire from one to five (see Figure 1). Each rating was a measure of how complete a characteristic had to be. For example, the dictionary had to be a four rating, while the query language was five.

Each package was similarly rated by the DBA on the basis of technical conversations with the vendors and interviews with end users. Our findings were presented to the vendors for their concurrence.

When presented with our plans and findings, the vendors were quick to cover shortcomings in their products with reports of new capabilities "under development." Whenever this happened, the area was noted and reviewed periodically. Only if it was apparent that there was no progress was no credit given.

In the final ratings, features under active development were included, albeit with lower rating, on the basis of beta site visits, prototype installations and technical documentation.

Information with which to rate vendors was collected from the following:

- Presentations by marketing personnel.
- Interviews with technical staff, discussing how a particular problem would be approached (the same for each).
- Interviews with user sites, taking the political environment into account, as well as their progress and satisfaction.
- User site visits, without the marketeers, seeing the actual use and, if possible, fondling their data.
- Technical material in the form of installation, operation and users' manuals.
- When offered, classes on the usage and internals. These provided invaluable insight into the problems and performance to be expected. These classes are offered by vendors and also are available through contract firms.
- User group meetings and correspondence. These gave additional information on application uses, but their primary benefit is in measuring the support given to subscribers. (Note: A bit of cheek is required to invite oneself, but it is well worth the while).
- A visit to headquarters. This was always offered, although a chat with the "back-room boys" yielded more information than a lunch with the regional manager. Although we were constantly aware that an intense R&D atmosphere might be "staged", we found only a few to be less than genuine. (An excuse for the lavatory allows one to find the laboratory!)
- Finally, the trade journals were reviewed for agreement, and calls were made to the vendors to clarify conflicting claims or findings.

The information thus, gleaned was carefully noted for reference in the job of ratings to come.

Each feature was rated on the same one-to-five scale that Belchfire used. When capabilities were lacking, or insufficient detail was available, the vendor was contacted again. When a feature was under development, the vendor was asked, politely, to give proof. This proof may have been in the form of beta site visits, or technical publication — some idea that we were not simply encountering more horseradish.

Barriers to Progress

The collection of data took three months, from June through August. Evaluating this data took two more months. A surprising number of problems stood in the way of a logical selection — all of them posed by marketing. For instance:

- It was claimed that our approach was wrong and based on the wrong idea of what a DBMS was.
- Some said that the goals were unrealistic and unattainable (perhaps).
- Always, the competition claimed that one package was better than another (C'mon folks. You are only competing with the Belchfire; you are shadow-boxing!).
- Three times, spurious user analysis was used, each one "classified" as to origin, each one traced to an author in the vendor's shop or a project that never happened. (I do not think I can name names here, but it is fun to think of the consternation I have just caused).
- Finally, there was the old "end run to "higher management" (and thence to me) by a salesman who thought he needed an "in."

As you can tell, we were getting down to the wire. A decision was due in October 1978. The products were being pulled apart like they had never been before, and the ol' soft shoe was not working. For the most part, the vendors were super cooperative and only became desperate when it was obvious they were falling behind.

You'll recall that we had rated each of the requirements as to its critical importance on a scale of one to five to establish the ideal characteristics. The vendors were rated in the same manner, with frequent recontact to clarify questionable areas. Finally, the ratings were compared.

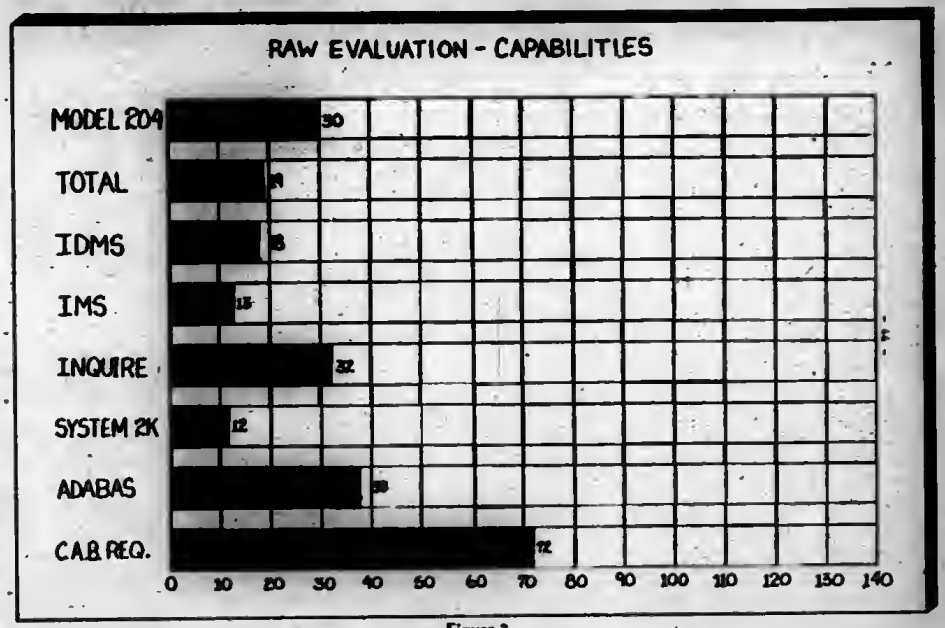

Figure 2

The most useful comparative technique proved to be graphics. Differences ambiguous in tabular form became crystal clear on a chart. Whenever conclusions were still not definitive with one presentation, the DBA recharted the information with other techniques (see figures 2 and 3). What emerged from this rather simplistic approach was surprising: It not only proved which was the correct system for us but also established as fact what

(Continued on In Depth/8).

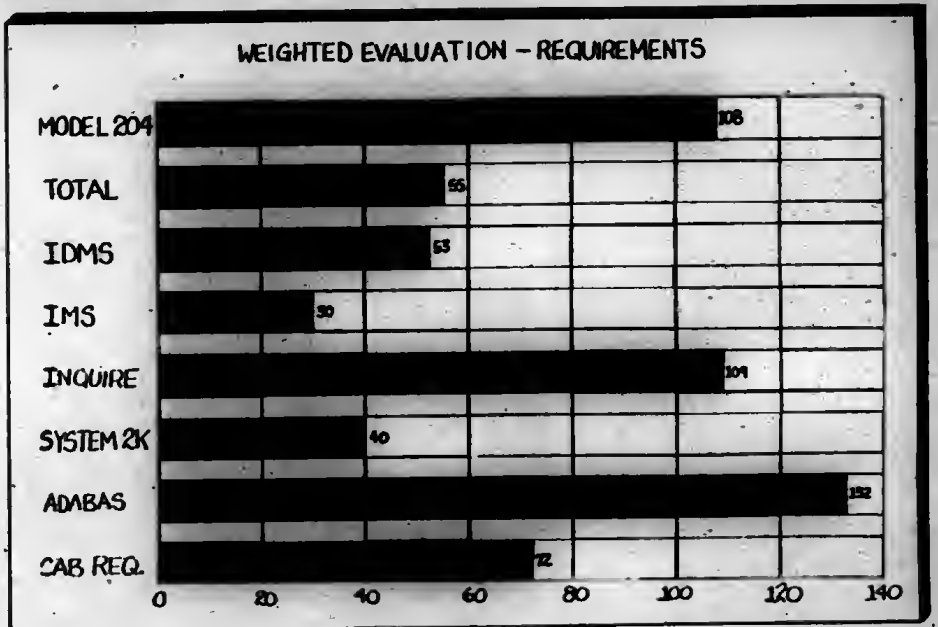

Figure 3

IN DEPTH

(Continued from In Depth/7)

had only been speculation.

The vendors' ratings were compared feature for feature with the Belchfire.

A chart was made, displaying each product and the Belchfire. Those products that did not measure up were dropped. This, strangely enough, established the distinction between user-oriented systems and designers' systems. We were definitely user-oriented; four "designer" types were eliminated.

One of our earliest controversies was whether to narrow the field by categorizing the candidates as either designer systems or user-oriented systems. Designer systems claimed a higher efficiency but acknowledged higher support costs, less flexibility and a more difficult learning curve for end users as well as programmers. User-oriented systems claimed the opposite, especially ease of use and flexibility at the expense of some efficiency.

Since we were interested more in effectiveness than efficiency — and by our own definition could not increase support staff — we were tempted to draw the distinction at the outset and evaluate only user-oriented systems. Because there was so much overlap and because no precise definition of either system existed, however, all products were included in the evaluation.

When the scores of the contenders were evaluated, our forgotten distinction emerged with emphasis! All designer systems fell short, while user-oriented systems were well within our requirements. I had established not only that three were comfortably within the "acceptable" range but also that the system we had the most questions about was lagging behind the other two.

With the field narrowed to three systems, a weighting scheme was devised to show which was the closest to the ideal. Using the same one-to-five strategy, each characteristic was rated as to its relative importance. This score, when multiplied by the original rate, would give an idea of the performance to be expected.

Deciding Factor

After we had charted them and combined them (see Figure 4 on In Depth/11), the results were decidedly inconclusive. Each package was better at some things, worse at others.

Acting on inspiration, we prepared a final chart showing, not the high points, but the lowest points. These would be the areas with which we could expect the most problems.

This last chart (see Figure 5 on In Depth/11) was the deciding factor. Although not outstandingly *better* than the others, Adabas would give us fewer problems.

We felt we could avoid or minimize problems by selecting the DBMS that would minimize troubleshooting and maintenance and would allow us to concentrate on the applications.

Since the successful installation of six live applications was a requirement of purchase, a demonstration for top management was scheduled for two weeks following the sale in mid-November.

A vendor's technician installed the

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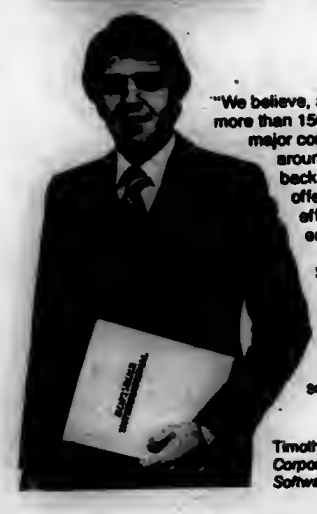

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"guts" of the DBMS in little more than one day. Another technician was contracted to assist in the implementation. His primary function during the implementation was to provide the expertise and keep us from making pratfalls. Although one person was assigned for each application, in addition to the DBA, a systems programmer and the technician, the overkill proved to be unnecessary.

After the recommendation was made and procurement had begun in October, the DBA began preparing general routines for conversion and control while the systems programmers prepared for the arrival of the new DBMS. Meanwhile, one by one, each of the applications programmers was reassigned elsewhere within the federal government.

Despite a reduction from eight applications programmers to three, we decided to "go for it." The DBA defined each application in turn, while the systems programmer and technician loaded it. The technician, accustomed to simply installing a test file and departing, said he felt trapped like a canary in a badminton game.

Since each procedure was established, installation of each served to refine the next. Consequently, the job became easier with time. Roecoe routines were made to do everything from generating the DDL from Cobol programs, to scheduling the loads, to making Cobol laundry programs from the DDL. The result of this forced activity was a discipline that continues today. The same philosophy enables a file to be defined, loaded and laundered, if necessary, in hours.

The implementation went as planned. Two weeks after purchase, users were treated to a demonstration of their own data — on-line — by their own people.

Final Component

The final component of our DBMS was installed in June 1979 with delivery of Software AG's Natural language. After the initial brouhaha (which can be expected with any new product), we proceeded to make every mistake in the book. Although we got what we asked for with Natural, we soon realized we had asked for more than we were prepared to deal with. As the very first installation, we had no precedents or other users from which to learn. The documentation was geared to the power and capabilities of Natural, not toward its applications.

Natural is an on-line, interactive language with its own text editor and librarian for source and object code. It annexes the data dictionary so that references to files and fields are checked to be syntactically correct. If a record or field is misused as the program is being written, the line in error is presented for correction. If the programmer fails to correct it, the text editor is automatically invoked and won't leave until the error is resolved.

In plain language, the programmer can't make a mistake if he tries.

The compiler is invoked automatically whenever source code is tested or object code is cataloged for production. A Natural program can call another program, in Natural or in another language, and is not restricted to Adabas files. Parameters are passed from program to program with the same statement which formats the terminal screen, so a subordinate program can be tested simply by running — it will ask for parameters.

There is a full- or split-screen terminal capability with every option you can think of, to display/accept, intensify/blink, protect/unprotect, mask input and sound alarms. Screens are prepared with a statement remarkably similar to Fortran's FORMAT.

Source of Problems

Our problems began when we applied too little significance to the fact that, since Natural follows the defini-

(Continued on In Depth/10)

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IN DEPTH

(Continued from In Depth/9)

tion of the file of the dictionary, it is data-reactant structured (the best kind) by default. Whereas conventional DP demands that data be designed for storage (tape, disk and so forth), DBMS files are designed for their activity.

Where the conventional programmer may spend 25% of his time on data descriptions, 25% on I/O control (activating the data) and another 25% on directing the processing logic before he can start to work on a problem, Natural does the first three for you. By default. It seems logical that a program could be done with a 75% savings in time, for perhaps 10% of the code used with Cobol. It can be done, but not the way we started.

The first "human guinea pig" was a young apprentice with no prior programming experience. In three hours, she could be left alone without doing serious violence to herself, and after six hours she had to be dragged off forcibly, since her program was done. Imagine the learning curve of an experienced programmer, if a mere typo could do that!

Unfortunately, I made the mistake of comparing Natural to other languages, inadvertently encouraging programmers to apply the conventional procedures.

While Natural provides the capability to control data, I/O and process logic, attempts to do so interfere with the defaults, which are the optimum for a file. In other words, it is unNatural to process no data, so the IF NO RECORD FOUND ... literally pulls the plug on convention. Statements such as AT START, AT END, BEFORE and AFTER have very specialized meanings and become increasingly scarce, as do switches, flags and holding areas. Instead of the GO statement, the IF-THEN, DOWHILE, and DOWHEN structures are implemented.

It is virtually impossible to code from a flowchart, whereas coarse Hipo gives outstanding results. Assimilation of these new rules and breaking of old habits caused the learning curve of the experienced programmer to last weeks.

Another victim of the Adabas-Natural combination was the development cycle (see Figure 6). The practice of completely defining the application, then programming, then installing and training simply wasn't responsive enough to the needs of the users and programmers. The better technique was the heuristic development approach, which involved beginning the design, then beginning development without completing the design, then installing a sample of test data and starting training as soon as possible with the end user -- on live data, while programs were written. Since neither the design nor development were completed until after training, changes in either were easily performed without having to "reopen" anything. Completing the training before installation assured that the system was as complete as it could be and that the end user was satisified with it.

Optimum DBMS

With this experience, I can state that the optimum DBMS consists of the following:

1) The ability to rapidly define/redefine data files.

2) A full complement of utilities and the means to automate their execution.

3) A data dictionary integrated so as to reflect the character of the DBMS to all accesses.

4) A "natural" language with full online compilation/teleprocessing support (and no "calls," please).

5) Training in structured development and heuristic design.

6) Full support of management.

When relating the CAB experiences to potential DBMS users, I always advocate our approach, but admonish against accepting our findings. Although this may be a shortcut, the exercise of performing a user needs analysis and making a "crash" installation with live data files provides valuable information and sets the momentum at a "fast" pace for subsequent operations.

Each step in the selection process is important, but the verification of each claim, the review of each referral is paramount. Furthermore, since some people seem to have a knack for snatching defeat from the jaws of victory, it is important to look further than the package, to assess the people running the operation. Finally, when

IN DEPTH

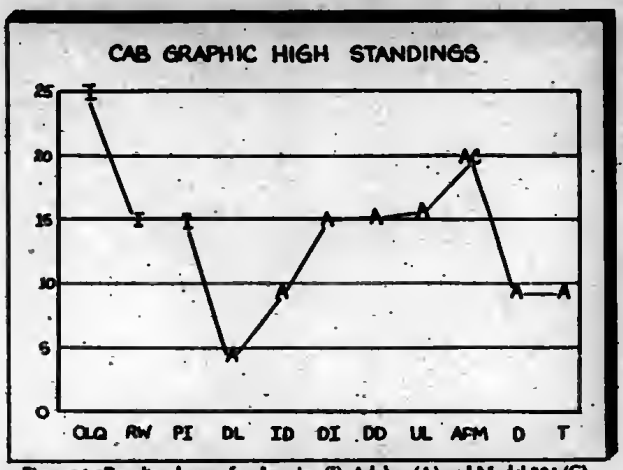

Figure 4. Results shown for Inquire (I), Adabas (A) and Model 204 (C).

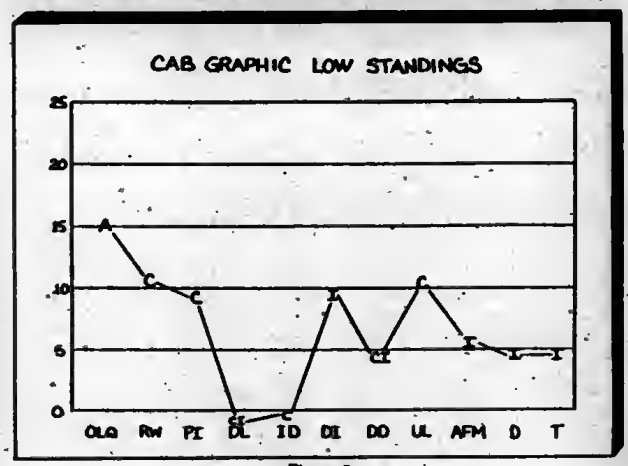

Figure 5

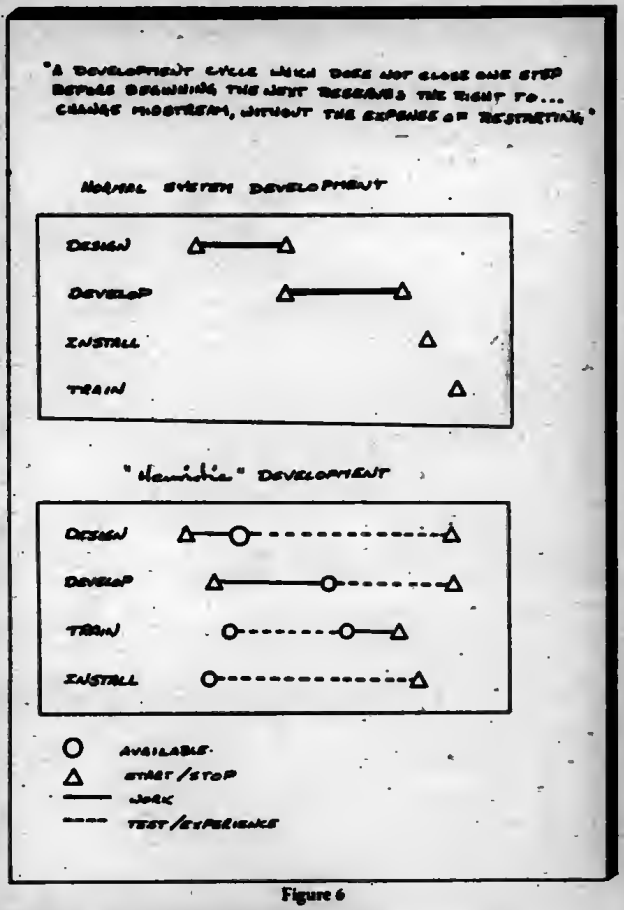

Figure 6

the end is in sight, keep the evaluation up to date with frequent reviews. I'm keeping mine current despite our purchase, just in case.

I have been contacted in past months by people wondering if they could use our approach and questioning whether we would have succeeded if it were not for our unique status.

I do not think that our achievements at the CAB were unique — only that we were the first. Following our programs, anyone can select and install a DBMS with just as excellent a chance of success.

The CAB has made history in a number of ways: first, as the first major government agency to sail into the sunset; second, as the first of a new generation of heuristic implementations; third, as the first to use Natural; and finally, as one of few success stories to come out of Washington. This last achievement may inscribe the CAB in the tablets of history more deeply than any of its previous actions.

Daniel A. Nolan is data base administrator at the Civil Aeronautics Board, Washington, D.C.

Nolan's previous experience includes development of systems for insurance, banking, advertising, education, manufacturing and government organizations. He currently serves on the faculty of the Graduate School, USDA.

Nolan plans in the future to concentrate on refining the heuristic development cycle.

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Obfuscatory Measurement

THE STATE OF THE ART

By David F. Stevens

In its monumental issue introducing the '80s, *Computerworld* (inadvertently, one hopes) failed to include a discussion of one of the principal trends in modern computer performance management, namely the flowering of obfuscatory measurement. As a whilom practitioner of that art, and as its principal (if not, indeed, its only) historian, I am pleased to have this opportunity to rectify that oversight.

In this article, I will first say a few words about the infancy of performance management and obfuscatory measurement, then look briefly at a few of the most popular current obfuscatory measures, discuss the foundations of obfuscatory measurement and, finally, suggest some opportunities for the obfuscators of the future in the areas of distributed processing, data base applications and word processing systems.

In the Beginning

In the beginning was the Vendor, and the Vendor's word was unquestioned, and the Vendor's word was "move iron!" Performance management consisted of noticing that the work wasn't getting done and calling on the vendor for assistance. It is not really very surprising that that assistance usually took the form, after a suitable interval of scholarly appearing activity, of additional hardware. It is somewhat surprising that the customers were so long in realizing that vendors exist to vend and that perhaps an objective look at what was going on would be desirable.

But the questioning of authority is a contagious disease. Shortly after the DP departments began questioning the pronouncements of the vendors, the users began questioning the pronouncements of the DP departments. The aroused user is a dangerous beast, capable of nearly superhuman feats — capable, even, of taking computing into its own hands should the provocation be sufficient.

It was in the search for suitably soothing salves that obfuscation began, and the purpose of obfuscatory measurement has remained steadfast from that day to this: to divert the users' attention from the true state of the system with an imposing array of numbers, presented with a certain fervor and a modicum of quasi-religious awe.

The obfuscator is assisted in this task by the universal bureaucratic preference for numbers over judgment. ("Quality of service" is a subjective entity; one who presumes to judge it is subject to being overruled. "CPU utilization," on the other hand, is not a judgment but a determinable numeric quantity. [Better still, the means by which it is determined are under the control of the DP department.] It is, therefore, a Comfortable Construct, and hence much used in the world of obfuscation.)

He — the obfuscator — can even call on Lord Kelvin for moral support: "When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind."

(But the truly competent obfuscator is also aware of opposing views. This, from Daniel Yankelovich, for instance: "The first step is to measure whatever can be easily measured. This is okay so far as it goes. The second step is to disregard that which can't be measured or give it an arbitrary quantitative value. This is artificial and misleading. The third step is to presume that what can't be measured easily isn't very important. This is blindness. The fourth step is to say what can't be measured doesn't exist. This is suicide.")

A consequence of modern Kelvinism is the sense of heightened importance imparted to a quantity by the mere fact that it is being measured. Unmeasured qualities pale, unlamented, into insignificance when faced with detailed plots of interrupts per initiator or passwords per protocol.

Evaluating the Inaccessible

One other contribution, perhaps accidental, to the development of obfuscatory measurement is the complexity of the systems measured. In the ideal world, one would be able to measure directly the quantities of presumed interest. In the world of computing, those quantities are often well-protected and inaccessible. One must, instead, measure either their causes or their effects.

As indicated in Figure 1 (on In Depth/15), the (inaccessible) interesting quantities are often the products of several (accessible) causes and give rise to (some aspects of) several (accessible) effects, but the relationships are quite diffuse.

For example, one quantity which is generally thought to be interesting is the amount of user work passing through the system. That it is at present unmeasurable is unquestioned. So we measure various causal quantities (jobs, tasks or sessions; overhead activities; queries; transactions; degree of multiprogramming) and various visible products (CPU and channel utilization; Abends; response time) and perform some unmentionable calculations therewith to produce our obfuscatory reports.

And indeed, it works: bamboozled by "97% success ratio" ((submissions-Abends/submissions) and "83% saturated" (CPU utilization), the users go away knowing something is wrong but having no loose end to grasp.

Popular Obfuscatory Measures

Following are the most popular obfuscatory measures of the '70s (in alphabetical order).

1. **Availability.** Usually expressed as a percentage, "availability" is taken by the uninitiated to indicate the amount of time the system is usable, whereas in fact it indicates the amount of *scheduled* time the system is available *to the computer center*. By reducing the base to scheduled time, a significant increase in percentage is obtained. It is further increased by including many periods of time when the system is not, in fact, fully usable: start-up times, time spent rerunning lost or interrupted jobs and time devoted to the "run-down" before a scheduled interruption.

Figure 2 (on In Depth/15) illustrates the cumulative effect of all these adjustments. It shows a week in the life of a one-shift operation, with one period of preventive maintenance (PM), a daily system development shot (SD) and two unscheduled periods of downtime (15 minutes on Tuesday and an hour on Friday). Start-up requires half an hour, and "run-down" starts a half-hour before system development time and an hour before the end of the shift. Naive and obfuscatory measures stand in rather sharp contrast.

2. **Average Response Time.** This has superseded "turnaround time" as the most commonly quoted measure of turnaround, but the principles of use

(Continued on In Depth/14)

IN DEPTH

(Continued from In Depth/13)

are the same.. Its obfuscatory nature depends essentially upon the fact that the mean can easily be manipulated by stacking the extremes. To be specific, you can achieve essentially any average response time you wish by requiring a suitable number of trivial interchanges — with zero response time — to take place during any interactive session.

The obfuscator also has a great deal of flexibility in the definition of the event that "response time" is monitoring. I have seen it variously defined as:

- Acknowledgement of the command/request.
- Commencement of the process.
- First character of (process) output.
- Last character of (process) output.

The first and third of these are most in keeping with the obfuscatory art; the third is especially so if the process was designed to give an instantaneous preliminary response.

Another fact to be borne in mind is that, in some situations, response that is *too* quick creates tension, which causes errors — and errors lead to wasted work, thus bringing saturation (and hence the opportunity for growth) ever closer. (A better strategy, however, is to strive for consistently unexpected response time, whether it be quicker or slower than anticipated, but this is somewhat off the subject of this article.)

3. Channel Activity. A utilization measure, and thus inherently obfuscatory, channel activity also exploits certain limitations in hardware design. For while it appears to measure data traffic, it in fact merely measures the time a certain hardware flag (the "channel busy" flag) is set. The actual relationship between channel activity and data traffic can be quite complex, depending not only upon the speed of the attached devices but also upon the housekeeping tasks that utilize the channel. The data traffic is always less than indicated by the obvious calculation (device speed multiplied by channel active time): indeed, it can sink to well below 10% of that number.

4. Depth of Multiprogramming; Overlap. These two measures are grouped together not because they are thought to be equivalent (they are not), but because they address the same problem: a vague understanding on the part of upper management that some multiplicity of processing is desirable (to an obfuscator, multiplicity is merely advanced duplicity). They make a good combination, not only because they obfuscate in different ways, but also because the two together give no more accurate a picture than either one singly.

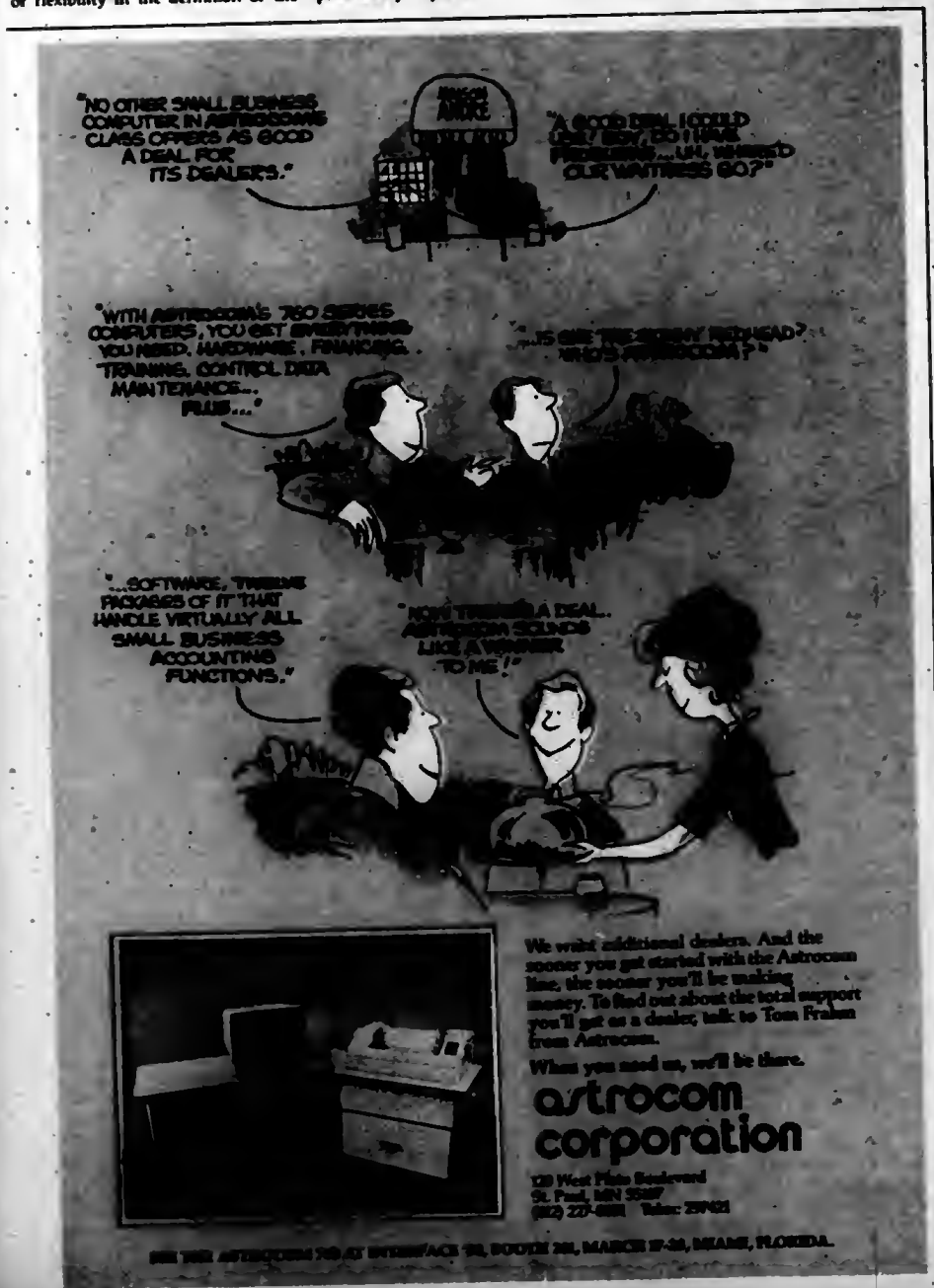
Overlap is in fact somewhat less obfuscatory than depth of multiprogramming, for it measures the percentage of time that some amount of simultaneity is experienced; it does not, however, consider the level of simultaneity. (Thus two simultaneous processes are every bit as good as seven.) It may be this very touch of honesty, paradoxically, that makes overlap so useful as an obfuscatory measure.

Depth of multiprogramming, on the other hand, is pure obfuscation: it counts initiators instead of processes. In many shops, large values of depth of multiprogramming survive as tribute to the memory salesperson's art, while all the jobs lie quiescent, awaiting the pleasure of the resource manager or some other such system magus.

5. Efficiency. This is actually a vestige of the more distant past, but one which has validity in some contexts and adds a certain panache to many performance measurement reports. It is often used in place of "utilization" (the two are identical in meaning). (I would advise against using them both to refer to the same quantity: such a juxtaposition might inspire tiresome questions. "CPU utilization" and "channel efficiency," on the other hand, provide a nice appearance of breadth.)

6. Lines of Code. This measure, being directed at human productivity, might be considered by some to be somewhat outside the scope of this article, but programmer performance *is* an element of computer center performance and lines-of-code superbly obfuscatory. The reason for this is that it does, in fact, measure productivity of a kind — the kind that will saturate your systems in a hurry.

A timid person might hesitate to use lines-of-code on the grounds that it is patently absurd (is the Beer Bottle



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OBFUSCATORY MEASUREMENT

IN DEPTH

Song ["One hundred bottles of beer on the wall . . . ."] better than a Shakespearean sonnet? a limerick than a haiku? this article than the Gettysburg Address?), inasmuch as it ignores quality. Such a person severely underestimates the power of numbers to convince and confuse.

7. Mean Time Between Interruptions (MTBI). The mean time between failures (MTBF) is so well accepted as a reliability measure in engineering contexts that practically no one questions its DP analog, MTBI. That the causes of failure in the two fields are largely unrelated is largely ignored: failures in mechanical systems are caused by wear and fatigue (to which software is impervious); failures in computing systems are caused by unexpected input (to which mechanical systems are rarely exposed) and trivial overflows (which, if they cause damage at all in mechanical systems, cause trivial damage: will an overflow on the meter crash a taxi?).

The user-oriented measure that most closely corresponds to MTBI is the mean (or median) service interval. To see how they compare, we return to the sample week of Figure 2. The mean service interval, even giving full credit for the run-down periods, is 2.23 hours (26.75/12), and the median is 2.5. The *conservative* way to calculate MTBI is to divide "hours available" by "number of interruptions plus 1": 32.75/3 = 10.9 hours — more than three times as long as the *longest* service interval.

8. Saturation. The obfuscatory nature of "saturation" lies in the fact that saturation is not a measure but a binary condition: the change in the quality of a service which moves from an unsaturated condition to a saturated one is an abrupt discontinuity: service effectively stops and the input queue becomes infinite. (We have all seen that happen with expressway rush-hour traffic.)

References to "80% of saturation" thus really mean "80% of capacity" and are doubly obfuscatory because "capacity" changes with work load and environment. It is not a configuration constant; any reasonable multiprogramming system, for instance, has a smaller capacity when restricted to highly compute-bound jobs than when fed a mixture of compute- and I/O-bound work.

The obfuscator exploits this phenomenon in other ways; it is much less well-known, for example, that any multiprogramming system strongly dominated by priority considerations has a smaller capacity than a system free to assign requested resources (such as the CPU) in an optimal fashion. (Is it any wonder that priority-dominated scheduling is so popular?)

9. Turnaround Time. Since the good turnaround times are the small ones, this is a situation where the median, surprisingly enough, favors the obfuscator. Nevertheless, I recommend sticking with the mean. For not only is the median a dangerous precedent to set, the mean is, as we have seen above, quite a tractable index.

As in the case of response time, the enterprising manager can cause enough small jobs to be submitted to achieve whatever mean turnaround time is deemed necessary. If this fails to provide the desired result, in desperation one can always define turnaround time in CPU terms, thus avoiding the semi-infinite delays of many print queues.

10. Utilization. When the obfuscator is asked for measures of throughput, he has ample industry precedent for responding with measures of utilization. Utilization measures are advantageous because they reward ineffective programming (which is much easier to obtain than the other kind).

The obfuscatory path here is not quite as free as it used to be, what with the introduction of distinguishable "system" and "problem" states for CPU utilization, but it remains the case (thanks to your friendly mainframe vendor) that much of what is called "problem state" is actually system overhead. And it seems extremely unlikely that anyone is going to come up with a meter that distinguishes between "system" and "problem" channel activity states!

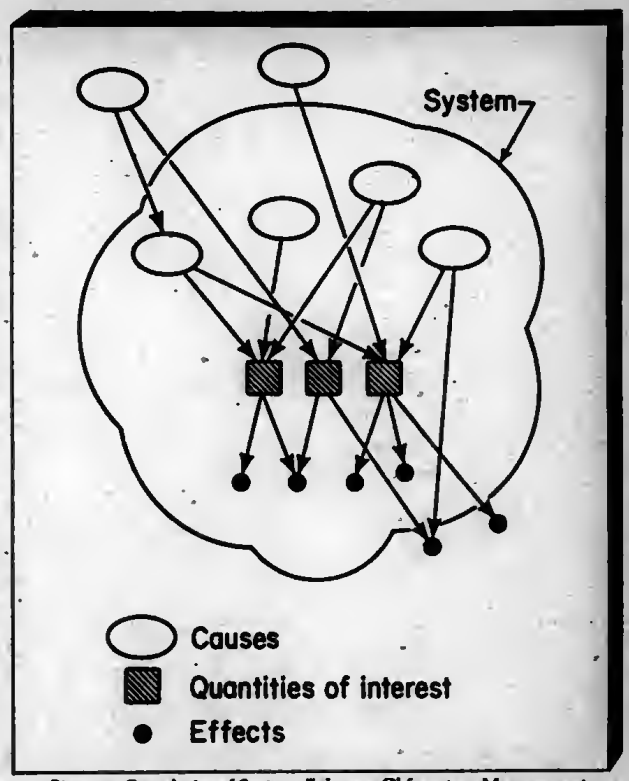


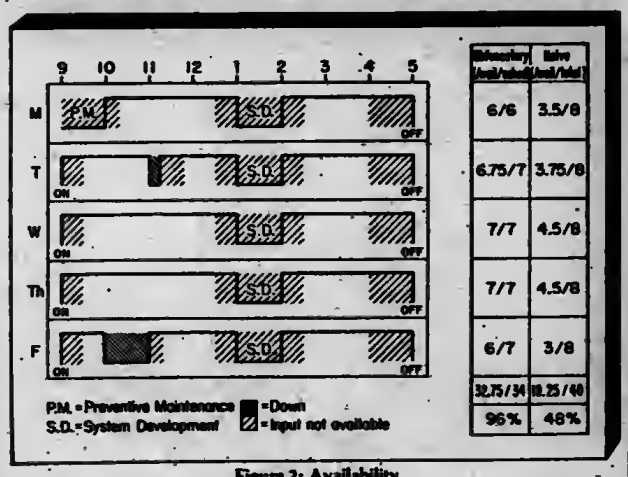
Figure 1: Complexity of Systems Enhances Obfuscatory Measurement

Fundamentals of Obfuscation

Having seen the list of the 10 best obfuscatory measures of the '70s, you should be able to pick out the most likely newcomers for the '80s. My selections follow, but first a quick resume of the underlying principles of obfuscatory measurement.

1. Select your measures with care. Not all measures are appropriate to all situations. You should neither attack the fly with the cannon, nor the elephant with the featherduster. Tailor your measures to the tractability of your users and the gullibility of your upper management — and always have a couple in reserve, just in case . . . In particular, your measures should be

(Continued on In Depth/16)



	Obfuscatory (Avail/Total)	Naive (Avail/Total)
M	6/6	3.5/8
T	6.75/7	3.75/8
W	7/7	4.5/8
Th	7/7	4.5/8
F	6/7	3/8
	32.75/34	18.25/40
	96%	46%

Figure 2: Availability

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IN DEPTH

(Continued from In Depth/15)

expressed in units that are well understood by your staff and over the consumption (or generation, as appropriate) of which they have rather complete control. In so doing, you create a climate in which improvements in the measurements are practically assured.

You can also utilize the more traditional motivators: 100% CPU utilization can be guaranteed, for example, by telling your sytem supervisor that his pay will be his basic salary multiplied by the average CPU utilization for the month.

2. Seek the advice of your mainframe vendor. Remember, the vendors were the first great obfuscators, and they remain members in good standing in this august fraternity. Furthermore, your vendor holds your interests close to his heart, for he cannot sell your additional equipment until your upper management is convinced of the saturation and effective utilization of your existing configuration.

Furthermore, your vendor has a wealth of experience in dealing with upper managements just like yours. Obfuscation is the very essence of the salesperson's art, as you seek legal advice from a lawyer, you should seek obfuscatory advice from your vendor.

3. Use the easiest measures. The easier a measure is to obtain, the more likely it is to be obfuscatory. (This is a rare *favorable* instance of Murphy's Law.) Two particular kinds of easy measures are worth special consideration: *means* and *percentages*. As we saw in the discussion of availability, suitable definition of the base can turn any measurement into a praiseworthy percentage.

As for the mean, it frequently lacks meaning. Even though the recent literature has exposed the obfuscatory nature of "indiscriminate" use of statistical concepts, the mean is so beloved by the average person that its utility is expected to continue relatively undiminished. One can still, for instance, report a favorable mean in preference to a realistic median in most circumstances. It is generally useful, in fact, to ignore all such distributional details as peaks, extremes, modal values and repetitive and seasonal patterns in favor of the universal mean.

4. Exploit comfortable analogies. Concepts that are meaningful in other fields can sometimes be transferred to the computer performance arena, where they are invalid, without loss of prestige. It helps, of course, if the concept is so familar that it is accepted without question in its new context. MTBI is such a measure.

5. Pick evocative names for your measures. The creative definition of measurement jargon is an indispensable element of the obfuscator's arsenal, for the most misleading percentage you can devise won't help you unless you can convince someone that it measures *something*. If yours is an elementary situation, actual definition is not important: a catchy name is all that is required. (Remember "CPU efficiency?" Was there anything efficient about it? A modern example is "depth of multiprogramming.")

If you find youself in deeper waters, some measure of definition must be supplied, but it is best if it is either ambiguous or incompletely specified. ("Availability" as "percentage of time available" is, as we saw, an excellent example of this technique.)

Future Obfuscatory Measures

The most fruitful areas for the development of new obfuscatory measures are those portions of the DP universe that have caught the public fancy but for which there is no common agreement on terminology. In today's world, data base, distributed processing and word and text processing would seem to be the prime candidates, with executive information systems coming along rapidly.

On the grounds that something should be left as an exercise for the reader, I will not undertake to predict likely obfuscatory EIS measures, but will content myself with a few guesses in the other areas.

1. Word and Text Processing:

a. Number of words in the spelling corrector. This measure is somewhat outside the mainstream of this article, being a bit of vendor obfuscation unlikely to see much use in the dialogue between the system guru and the user. But it is perhaps worth recording if only to show that the vendors continue to break new obfuscatory ground.

It is, of course, intended to prevent deeper inquiry into the spelling system: How much does spelling correction cost in time and space? How many of those words will I never use? How much of my company's idiosyncratic vocabulary is missing? How hard is it to add new words? Delete existing words? How many of them are misspelled?

b. Documents per day. This is the text-processing equivalent of job and session counts. The obfuscator need only provide a suitably fluid definition

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OBFUSCATORY MEASUREMENT

of document to ensure that his productivity figure of merit will show a gratifyingly steady upward trend. In this connection, it is useful to note that many word- and text-processing systems have facilities for interoffice mail. One should perhaps exercise patience here and add messages to the document count only when the pressure for productivity reaches fever pitch.

c. Keystrokes per hour. If you plan to use this one, you'd better be prepared to replace space and backspace keys rather frequently, and you might as well order systems with no tab facilities. (Why pay for a feature the operators will ignore? Of course you can counter that ploy by giving credit for tabbed-over blanks at the cost of midpage indentation . . . .)

d. Response time. This old favorite will measure the time from last keystroke to the appearance of the first page of the first copy of the document, thus sidestepping the true issue of concern (document delay time).

e. (To be supplied later). This is another exercise for the reader, for I cannot figure out how the practicing obfuscator can dodge the issue of the appearance of the document. My guess is that he will stonewall it or try to smother it under tons of productivity data. After all, time is on his side. Within another generation, no one will remember the pride once taken in individually formatting documents on the basis of amount of text, purpose and intended audience. (Sigh.)

2. Distributed Processing:

a. Message volume. As usual, activity will be quantified instead of qualified. Concern over the content and information density will be submerged in a welter of statistics on messages per hour, per node or per node-hour. Intricate diagrams of internodal traffic volume will be used to overwhelm those concerned about possible mislocation of files and data.

Volume can then be increased by simply reducing the maximum allowable information content per message. This can often be done in the name of reliability.

b. Reliability measures. As long as possible, reliability measures will be strictly hardware-component-oriented; that is, reliability statistics will be available on a node and link basis, rather than on a complete transaction basis. This makes it possible to quote quite impressive average reliability achievements, even at a time when the users are seeing essentially zero reliability.

For example, if you are dealing in 100-character messages over a two-hop path, a character reliability of 99.5% can be achieved while end-to-end message reliability drops to barely more than 3%. (There are five steps in a two-hop path: two links and three nodes. A figure of 99.5% on the character level can translate into a one-character error in half the messages at each step. That is, the probability of successfully negotiating each step can be as low as .5; the probability of completing the journey can thus be as low as [(.5)**5] = .03125.)

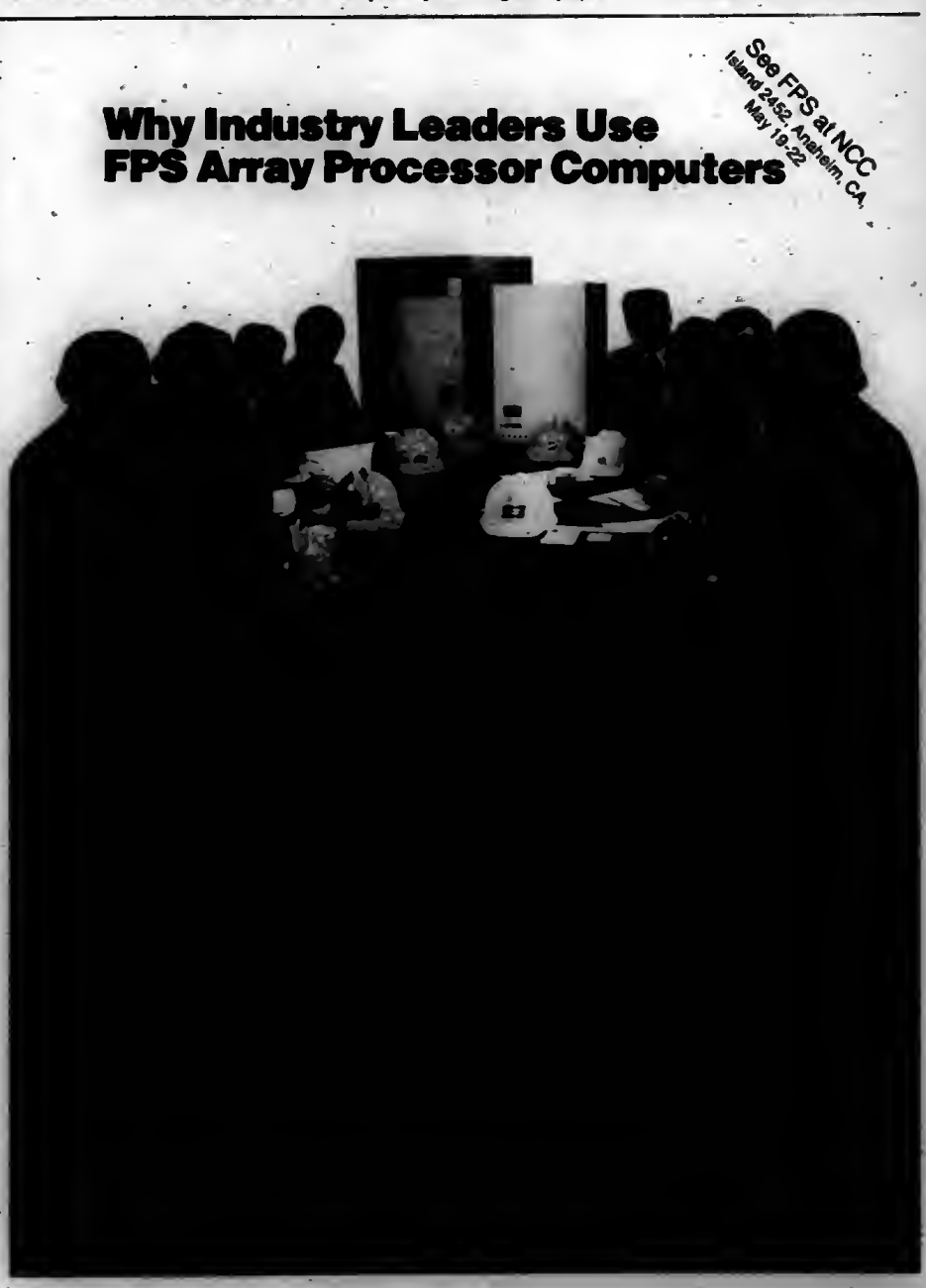
While on this topic, it is well to note that the obfuscator has a choice of character-level or message-level reliability measures. He should choose the one that best complements his error-pattern.

The key to the decision is the clumping tendency of the errors. If errors tend to occur in bursts, then the character-error-to-message-error ratio is high, and one should report message errors. If errors tend to be isolated, on the other hand, the character-error-to-message-error ratio is low, and you may wish to consider reporting on character reliability instead. (The exact conditions under which this becomes desirable are best left to the obfuscator's discretion, inasmuch as a proper choice depends upon the sophistication and docility of the users as well as upon the error patterns.)

c. Step counts; complexity. A favorite ploy, early in the game, will be the "Can you top this?" game, played with link and node counts. The number of steps negotiated will become more important than the manner in which they are negotiated. A perverse pride will even become evident in discussions of the number of transformations or translations to which the data must be subjected. Counts will reach incredible highs.

As an example of what can be done even when the system is not very widely distributed, given suitable sys-

(Continued on In Depth/20)



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IN DEPTH

(Continued from In Depth/17)

tem architecture, consider the path of an execution module in a large-scale batch installation. Two computers are traversed, a front end and a mainframe; each computer is comprised of peripheral processors (PPs) and a central processor. The path from card reader to execution contains the following steps: card reader, front-end PP, front-end buffer, PP, front-end queue, PP, front-end buffer, PP, mainframe PP, mainframe buffer, PP, mainframe queue, PP, mainframe for execution — some 14 nodes in all.

When you describe such convoluted paths in full detail, your users become grateful that *any* messages get through unscathed.

d. Availability. The creative definition of availability will become both simpler and more necessary as systems become ever more distributed. Simpler, because one can adopt various component-oriented strategies. (A 10-element system, one element of which is always down, can be assigned nearly any availability score from 0 to 100% by simply assigning suitable weights to the components. The wise obfuscator will strive for weightings which give results in the 95% to 98% range.) Obfuscation will become more necessary because true availability may be severely impacted by the necessity to stop everything periodically to reconcile conflicting updates. I have no doubt the obfuscators of the '80s will rise to the occasion.

3. Data Base: (Data base is, of course, a true natural for obfuscation, for its practitioners cannot even agree on the spelling of the name: data base, data-base, database.)

a. Data dictionary size. I believe that extremes will see currency in this area. Some obfuscators will take pride in the manner in which they have reduced the number of distinct data elements to a minimum.

Others will take equal pride in the flexibility of systems that allow hundreds, or even thousands, of distinct elements. The object, in either case, is to bewilder the users who want only — but all — the data elements they use.

b. Number of queries. This is good because it allows even erroneous accesses to contribute to the productivity score.

c. Average response time, connect hours, number of inquiry stations ... In short, any obfuscatory measure which can be applied to any interactive system will be applied to data base systems. Because the user community will in many cases differ almost completely from the traditional DP user community, the obfuscator will experience little danger in making this transition.

d. Any measurement on a batch system. Any measurement on a batch data base system must be considered obfuscatory in the sense that it diverts the attention of the users away from the fact that they don't have an interactive system.

It seems unquestionable that the obfuscators among us will find the fields of the future to be as fruitful as the orchards of the past, and that they will continue to enliven our lives with (in the words of Pooh Bah) "corroborative detail, intended to add artistic verisimilitude to an otherwise bald and unconvincing narrative."

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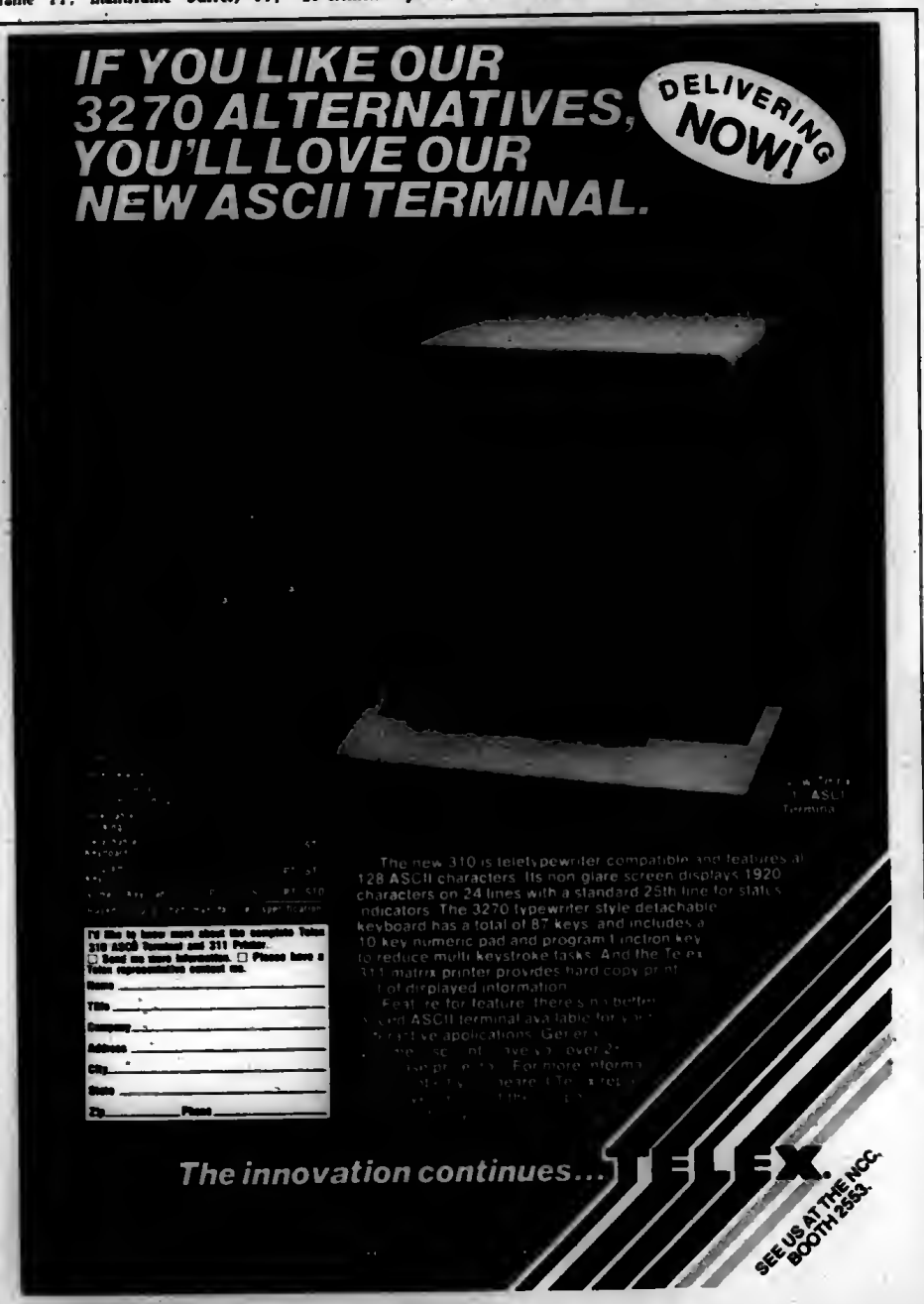
Stevens holds a B.A. degree from the California Institute of Technology and an M.A. from the University of California, both in mathematics.



Slowdown Ahead In Office Information

By Anne M. Mayfield

Forget those forecasts of explosive market growth in the office information industry. Problems among vendors and users will hold annual growth to 15% through 1985.

Industry observers for the past several years have been forecasting explosive market growth rates for the office information industry — anywhere from 20% to 40% for the early 1980s. However, we at Arthur D. Little, Inc. believe that the office information industry will grow at a more modest rate of 15% during the next five years. Even this projection may be optimistic if both vendors and users alike do not first overcome many significant hurdles.

Without doubt, there are many reasons for the more optimistic projections. Explosive growth can certainly be expected — but over the long term, not the short. This growth may be traced to a number of causes:

● *Information overload.* Business people are becoming more concerned about receiving the proper amount of information in a timely fashion and in a usable format. We have been saying these words for many years, but the concern has now become real enough to convince business people to invest in solutions. Note the increased use of data base news services, overnight package delivery services and portable terminals, all of which provide more timely access to information.

Similarly, the proliferation of terminals distributed to end users indicates increased interest in receiving timely information.

Still the major issue remains: how to deliver the proper amount of information in a usable format. Computers are well known for the proliferation of information in unusable forms. It is far too easy to print 15 pages of information where one graph and a trend line would give the same data in a more understandable format.

Now data base querying, indexing software and graphics terminals are helping to present information in a more usable form, but we still have a long way to go.

Then, too, this proliferation of information is being encouraged by external influences such as the federal government. In March 1979, the Business Roundtable, composed of 48 of the largest U.S. corporations, reported that each member spent an average of $54 million annually on producing reports for the federal government. Accordingly, business people who are forced to spend significant amounts of dollars to produce information are looking for ways to reduce this expenditure and make the information more relevant.

● *Productivity.* It is generally accepted that the next area management should concentrate on is white-collar office productivity. For secretaries, the self-correcting typewriter offered the greatest boost in productivity in recent years, while for all office workers, the latest time-savers have been the telephone and the copy machine.

Clearly, office workers and their work environment have not changed dramatically in the last 50 years. Now, however, the information explosion, coupled with rising labor costs and decreasing equipment costs, has given management the reason and the means to address the productivity of white-collar office personnel in general.

Another clear trend in business today is the need to focus on management productivity. In many offices, total management salaries are three to four times higher than support staff salaries. In paper-intensive offices such as law firms or consulting firms, the relative cost of professional time is even higher.

● *Energy costs.* Increased energy costs over the last five years have affected all of our lives and will contribute to growth in the office information industry. For example, the cost of a three-day business trip from New York to Los Angeles jumped by 25% from 1978 to 1979, largely because of increased fuel costs. Thus, business people now have more and greater incentives to consider whether voice or video conferencing could effectively be used in place of personal meetings which require travel.

One such video conferencing service offered by AT&T provides video conferencing facilities between cities. As this article was being written, a one-hour Boston-to-Washington conference could be conducted at a cost of $220, and simultaneous conferences among numerous cities are also available. Many other companies are conducting internal experiments with electronic blackboards, still-frame video conferencing and other methods of electronic conferencing.

Rising energy costs, as well as the desire to eliminate commuting time, have made working at home more attractive. For example, the groundwork is being laid in France where, by 1981, 250,000 homes will be equipped with terminals for telephone directory assistance. This is only a beginning, but an extension of this interactive tool could allow data entry operators, text processing specialists or research assistants to work full time out of their homes. Consultants, lawyers and other professionals could also conduct business through the home terminal electronic mail network. In the same way, all households could receive their newspapers, journals and "junk mail" electronically.

Thus, the office information industry has a bright future. Many forces will be pushing the growth of the market, but the near-term growth may be disappointing.

Problems for Vendors

The office information industry is closely tied to the computer industry, where signs of trouble are already evident. As reported in "The Revenue and Profits Squeeze in Data Processing," a recent Arthur D. Little Impact Services report, "in the second half of 1979, after-tax profit margins declined and revenue growth rates slackened considerably among leading data processing industry participants." Company reports so far in 1980 show the trend continuing short-term, so that even without a recession, the data processing industry as a whole has begun to slow from its normal growth while some companies continue to do well.

The general decline of margins and the lack of revenue growth in the data processing industry can be attributed to: (1) increased manufacturing costs, (2) increased salaries, (3) high cost of capital and (4) lack of software.

The office information market will also have a fifth factor to contend with — the embryonic and/or ever-changing nature of that particular market.

The problems, in more detail:

1. *Increased manufacturing costs.* Manufacturing costs appear to be rising faster than the general inflation level. Semiconductor chips are declining in price (though not at the moment), but chip prices have now become a small percent of the cost of manufacturing vs. peripheral equipment. Therefore, their decreasing costs can no longer have such a significant impact on equipment costs.

Power supplies, displays, cabinets and mechanical devices are becoming, in percentage terms, very expensive. On a $10,000 piece of text processing equipment, for example, a twin sheet feeder (for feeding paper automatically) will add 20% to the equipment's price. The recent rising cost of raw materials also has contributed to rising manufacturing costs; and increasingly, equipment prices are being forced to reflect software development costs.

2. *Increased salaries.* An acute shortage of qualified marketing, customer assistance, software and field engineering personnel is driving salaries upward in the DP and office information industry. This is especially critical in the office information industry, where marketing is costly and development of software that can enable nontechnical people to operate equipment will affect the growth of the industry tremendously.

3. *High cost of capital.* During 1979,

(Continued on In Depth/25)

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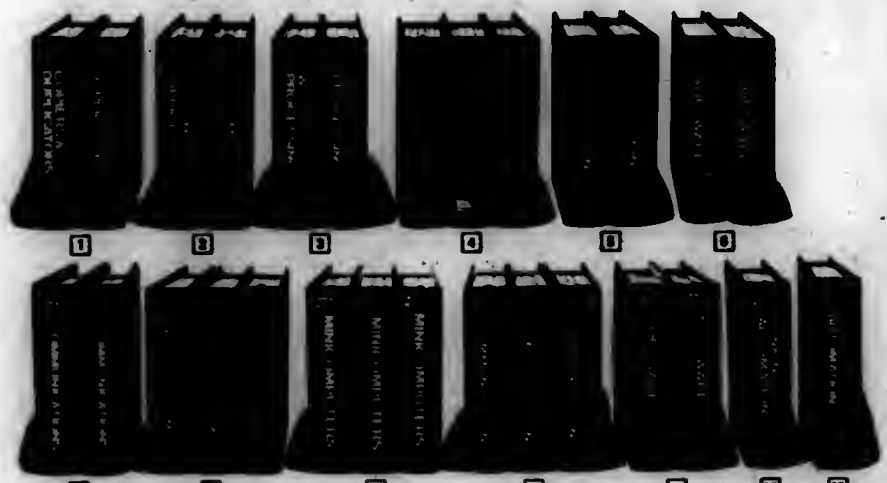

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SLOWDOWN AHEAD

IN DEPTH

(Continued from In Depth/21)

90 out of the top 100 electronics companies increased their capital expenditures 20% or more from their 1978 level. This is in large part because of increased automation of manufacturing processes and the resulting need to buy new equipment.

As of this writing, the prime interest rate is in excess of 20%. This interest rate not only makes it very difficult to fund growth, it also makes it difficult to continue leasing equipment.

The office information industry has always relied on leasing to gain new customers. Facsimile equipment, for example, is leased 90% of the time. Copiers and word processors have also been leased, so the customer has the option to return the equipment if it begins to breakdown or becomes outdated. Given the high cost of capital, vendors have no choice but to raise lease prices — or even drop lease plans — often at the expense of new customers. One text processor manufacturer, for example, increased its lease prices twice during the first quarter of 1980. In general, the high cost of money is impacting the greater potential of this capital-intensive industry.

4. *Lack of software.* Everyone wants to improve productivity, but they want it to be done on behaviorally acceptable terms. New machines should fit into existing work patterns and be easy to use. This is discussed further below in connection with new features the users need. The software available for today's machines is complex and limited in function; apparently much evolution will be required before the demands of a large part of the market can be met.

5. *Embryonic/ever-changing market.* The office information industry shares the problems facing the data processing industry as a whole, but, being an embryonic industry, it must also deal with constantly changing market dynamics. Text processing, for example, has no clear market leader. IBM provides equipment for all niches in the market, and its strategy has been to provide competitive products from three different divisions. But in the office information industry, no potential leader has settled on a product strategy. This is a clear sign of an industry which has not stabilized around one or two major competitors, as it has in the case of IBM in the DP industry.

This embryonic text processing industry also seems to be moving in conflicting directions. Rationalization — the buying-out of the smaller companies — is expected in the early 1980s. Witness Pitney Bowes, Inc.'s purchase of Artec Electronics, Inc. and AM International, Inc.'s purchase of Jacquard Systems, Inc.

At the same time, there is room for new entrants. The equipment is still evolving so vendors can easily play one-upmanship with equipment features or functions, and the market base is large enough (1979 sales of $1 billion) with a growth rate sufficient to allow newcomers. I do not mean to imply that there are no risks, however. Xerox Corp., for example, reported operating losses of their text processing equipment in 1979.

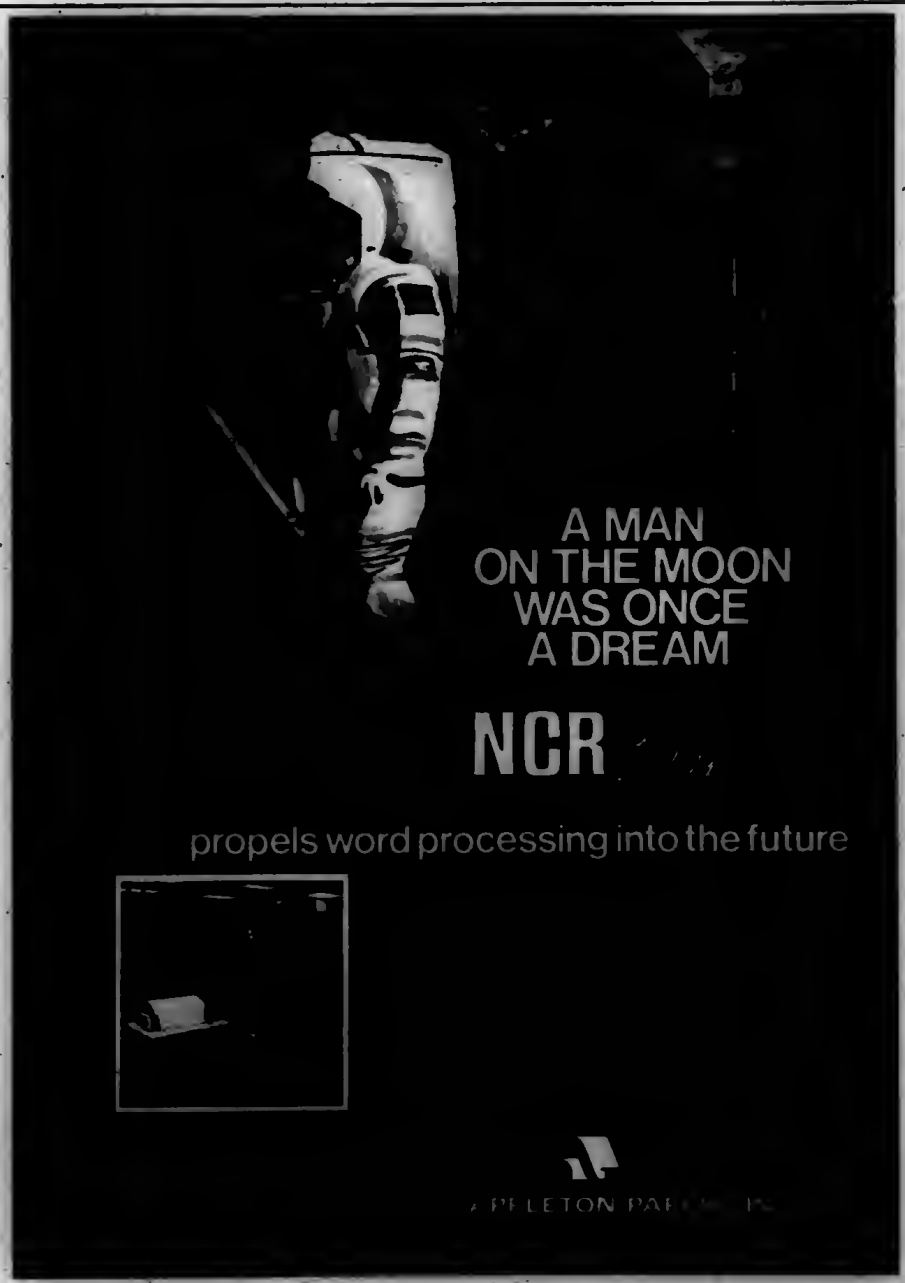
Newcomers which might be expected in the text processing market include:

- Data processing companies (encouraged by the success of Datapoint Corp. and Four-Phase Systems, Inc.).
- Large companies with capital to invest (another Exxon-type company).
- Start-up ventures (Axxa Corp. and Syntrex have both announced their first product during the first half of 1980).

Even the office information industry segments that appear to be more mature are undergoing rapid change. The copier market, for example, will witness a resurgence of growth as the intelligent copier's price decreases and its distribution widens. The intelligent copier will also be competitive with other office equipment: it communicates, prints in numerous type styles and copies. Thus, a new generation of integrated products will cross previously separate equipment lines.

Once again the question of leasing comes up. Customers aware of changing products will prefer to lease equipment and we can expect a drop in demand if this option is not available. Moreover, companies in high growth situations also need sufficient cash flow to fund growth and, in the face of the intense competition noted above, cannot raise prices as much as they would like. These factors, combined

(Continued on In Depth/26)



IN DEPTH

(Continued from In Depth/25)

with the high cost of capital, imply that the office information industry's growth rate may be tempered during the early 1980s — even more than that of the more mature DP industry.

User Difficulties

Users are also expected to contribute to a slowdown in demand in the office information industry in the early 1980s. Users, particularly in large corporations, have encountered several problems in equipment installation, including: (1) controlling the purchase, (2) analyzing productivity and (3) obtaining desired features.

1. *Controlling the purchase.* Despite the fact that office equipment and services are now based on the merging of telecommunications, data processing and office product functions, very few corporations have a single department which is knowledgeable about and responsible for purchasing this new type of equipment. Decisions up to now have been typically made according to the functional area, a method that worked well until market segments began to cross equipment lines and organizational functions.

Who now should make the purchase decision — data processing, administrative services, office services or telecommunications? Presently, it appears that most pilot office information projects are being coordinated out of the DP department with input from the other departments. As long as the technology must be modified for the specific organizations (and integrated equipment is not available off-the-shelf), it seems logical that the DP department will continue to take the lead in coordinating the purchasing effort.

But this conflict about who should purchase within the organization must be resolved before an organization will begin to buy in quantity. So until this confusion is resolved, the growth of the office information industry will be impacted.

2. *Analyzing productivity.* The office information industry has held forth the promise of greater productivity in the white-collar labor force. The text processors are a prime example of equipment installed to enhance the productivity of the secretary or typist. In a production atmosphere where every typed line is counted, text processors will definitely enhance productivity, especially if there are revised or repetitive documents.

Companies, however, are becoming less enamored of typing pools because they have created many organizational problems. Moreover, outside of a typing pool, any productivity benefits are less likely because training is less rigid, the machine is used less frequently and the documents produced are of varying kinds. In fact, we have even observed cases where productivity drops because of inadequate training and management.

Outside of typing pool applications, why do companies buy text editors? The answer lies in management benefits — greater flexibility to revise, the need to proof only the changes rather than the whole document, the ability to produce repetitive original typed documents and the promise of things to come: access to data bases, electronic mail, automatic scheduling and other features that will be mentioned later.

By 1990, the equipment/labor dollar trade-off will make it easier to justify the cost of secretarial workstations for

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all support personnel. But during the early 1980s, two things can happen — neither of which will help the growth of the office information industry in the short term. Some people will wait and see for a few years, while others will purchase stand-alone equipment — not integrated into systems outside the office — which is obviously an aid to productivity. Even in the second scenario, users may resist purchasing now because they will not want to replace the stand-alone equipment in the future when more advanced equipment becomes available.

3. *Obtaining desired features.* This tendency of some companies to wait till the "perfect" unit is available will also slow demand in the early 1980s. One of the most important features needed is the ability to use intermixed media: graphics, data, text and voice. Limited graphics are now available on some video text terminals, but this service is not yet commercially available. Other graphics and color terminals are available, but none appear to be fully integrated with readily available office systems. Engineering and manufacturing areas, where computer-aided design is becoming popular, will also need to be connected with the office network — with graphics included.

Integrated handling of text and data is also needed on office terminals. But limited memories and operating systems, which either maximize data or text handling but not both, still stand in the way. Text processors themselves are just now beginning to offer arithmetic packages, and small business computer vendors, in general, need to improve their text processing packages. This integrated text and data processing equipment is in an embryonic stage and, with the greater availability of memory now, we should be seeing data and text integrated on one machine more frequently.

Voice input, storage and output will also need to be available on office terminals. Upper level executives are going to demand voice input and storage instead of regular keyboarding. Voice input dramatically enhances the ease of use and makes the equipment much less computerlike. Thus, office information processing vendors have a long way to go in intermixing media.

Intercomponent Communication

Easy communications among components is another essential feature, and the absence of it could slow the growth rate of the office information industry during the early 1980s.

Text processing users in the past have always demanded unsophisticated nontechnical use of the equipment. Communications to a typical text processing user means the use of *any* telephone to communicate interactively to any other machine. Text processing vendors, in general, have not designed equipment which can manipulate text from one model of equipment to another. The text can be transmitted, but the code structure varies on different models so text material has to be doctored by adding or deleting codes before another model of equipment can handle revisions.

Moreover, these are just the problems encountered when attempting to communicate among one vendor's equipment models. If, in addition, one wants to communicate with different vendors' models or through a mainframe, phototypesetter or special printer, the problems begin to multiply dramatically. This points out the desperate need to upgrade the communications capabilities of equipment.

The communication of text will also require greater bandwidth and possibly different peak loading characteristics than is required for the communication of data. This causes problems for users relying on present networks which have been designed to carry data. Network vendors and text processing vendors are seldom one and the same, so coordination between the

(Continued on In Depth/28)

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IN DEPTH

(Continued from In Depth/27)

two will be important.

Another feature needed by users is "true electronic mail," which provides simple sorting packages (so the user can prioritize his messages), some physical signal — a blinking light or a beep — that shows messages are there, redialing if a line is busy, automatic notification when this individual receives his message and distribution list capabilities. Most commercially available electronic mail packages appear to be lacking in some or all of these features and also in ease of use. All of the aforementioned are needed now, will take time to implement and could seriously hurt the growth rate of the office information industries in the early 1980s.

Turning Points

The early 1980s will show a slower growth rate in the office information industry than many people originally forecast. The question remains then, what are the turning points which will signal the next dramatic upsurge in growth?

The advent of the proposed communications networks will be one such turning point and will allow many noncompatible pieces of equipment to communicate, thereby relieving some of the pressure on vendors to develop their own interface mechanisms. Moreover, these networks would serve as a stabilizing force since individual vendors and users at last will be able to fit their equipment to a specific network's specifications.

The advent of communications networks also requires that government policies be finalized, or at least that a regulatory action be clear, regarding AT&T, the U.S. Postal Service's Electronic Computer-Originated Mail offering, Bell's Advanced Communications Service and the Satellite Business Systems network.

Another turning point will be the advent of more integrated and modular products. This will resolve the questions about what features and functions are available from which equipment. For example, will a user copy from a facsimile device or from an intelligent copier? In turn, this will enable small vendors seeking their own niches to better define the existing niches. Users will also have less to fear about equipment obsolescence if the product is integrated and, through communication, can perform other functions. Moreover, modular equipment will allow additional features at minimal cost.

Finally, the direction of the general economy can be regarded as a critical turning point. As interest rates begin to stabilize — somewhere — and as the effects of the rising costs of energy become clearer, both users and vendors will be better able to plan their business strategies.

Thus, the latter part of the 1980s should show explosive growth of 20% to 30% annually. However, we should be prepared to see only a 10% to 15% growth in the early 1980s as users and vendors experiment with products, organizational issues and business strategies to take full advantage of the office information industry potential.

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Anne M. Mayfield is a member of the Information Systems Section of Arthur D. Little, Inc., Cambridge, Mass.

Mayfield concentrates on distributed processing, office automation and word processing. Her interests include marketing, business strategy and organizational issues for both the word processing industry and a broad range of end users.

Prior to joining ADL, Mayfield spent four years as a marketing representative for the Office Products Division of IBM. She holds a B.A. degree from Duke University and an M.B.A. from Harvard University.

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What to do after the programmer has left

QUALITY ASSURANCE TOOLS

By Robert W. Shirey

Suppose your organization sets up a new central staff to support previously scattered computer systems and to reap the benefits of modern software engineering. Your new staff may find that the computing environment defies conventional means to software quality. If the software was written by old-fashioned programmers, it is too late to do structured verification and validation of requirements, designs and coding. If the old systems are geographically dispersed, managerially independent and use many vendors' equipment, the new staff can't even set standards and mandatory controls.

Can anything be done? Yes. This article surveys automated testing techniques that such a staff can use to get a handle on old programs. It describes the dispersed, multivendor environment and defines and prioritizes software testing goals under those conditions. It surveys benchmarking and gives details of test drivers and monitors for Digital Equipment Corp., Honeywell, Inc., IBM and Univac systems.

1.1 — There is a gap between the ideals of software engineering theory and the reality of software maintenance practice.

For today's major software systems, we all know that perfect quality can't be conclusively guaranteed. Despite recent research gains, computer software engineering still can't assure the quality of large programs by formal methods such as correctness proofs. As Edsger Dijkstra says, testing only shows the presence of bugs, not their absence. But the user still expects the developer to run tests and show some minimum level of quality, especially where software is widely used and distributed. This article focuses on the kind of testing that is done after programs have been written.

1.2 — Many developers work under conditions that defy conventional approaches to software quality.

Many organizations have a central staff to develop and maintain software in support of numerous decentralized users. To improve software quality, these developers use many techniques. For example, two approaches to reliability are common. One approach rigidly standardizes the users' hardware, software and working procedures in order to reduce the number of variables to worry about. A companion approach limits user interference by using hardware and software security devices, by distributing object modules, but never source code, and by concealing internal specifications and designs.

But many developers can't use these techniques because of either the absence of an absolute central authority, the great diversity of equipment in use, the current poor condition of the software or a shortage of resources. Section 2.0 discusses these problems in more detail.

1.3 — Developers do many kinds of postprogramming testing.

In section 3.0, we analyze the different kinds of software testing that a central development staff needs to do. First, we define the objectives of software testing and list 10 types of tests that are needed at different points in the life cycle of a computer system.

Next, recognizing that the environment and available resources normally preclude equal attention to all types of testing, we define and prioritize four major testing categories to guide the choice of tools and techniques.

Section 3.0 sets a higher priority on achieving and maintaining functional correctness of source programs than on maximizing processing productivity. In the short term, when a comprehensive testing program is first organized, the need for debugging is usually very immediate and apparent, and most of the programmers and analysts have no special training or experience in computer performance evaluation. In the long term, though, as the central staff brings software quality under stronger controls, productivity and performance become more important.

Computer performance management has matured greatly in the past several years, and a wide variety of tools, methodology and advice is available. For the novice, the main questions are:

- Why bother with performance measurement?
- What exactly do we mean by performance?
- What should we and can we measure?

This article answers these questions and describes a collection of tools that enable a central staff to gather needed data.

Performance studies require accurate information of several kinds:

- System functions.
- System workload.
- Types and amounts of resources used.
- Service levels expected and experienced.

Sometimes data is easy to get, but many situations require sophisticated tools and techniques. Performance analysis of a significant automated system requires a deep, detailed understanding of that system. This article describes tools that can be used to implement a disciplined study procedure such as the one shown in Figure 1, even under the difficult conditions of a dispersed, multivendor environment.

1.4 — Comprehensive software testing requires automated benchmarking.

In most cases, program testing must be automated to be effective. A comprehensive test of a large program can't be made manually because the test requires too many components and must control or measure too many variables. Section 4.0 begins a survey of available tools and techniques for automated software testing. It defines the four parts of a benchmark test — system under test, test workload, test driver and test monitor — and discusses the difficulty of preparing a test work load. It also discusses the value of analytic modeling and simulation modeling as abstract benchmarking techniques.

Sections 5.0 and 6.0 continue the survey and discuss drivers and monitors. The detailed discussion covers desirable generic features of these tools as well as advantages and disadvantages

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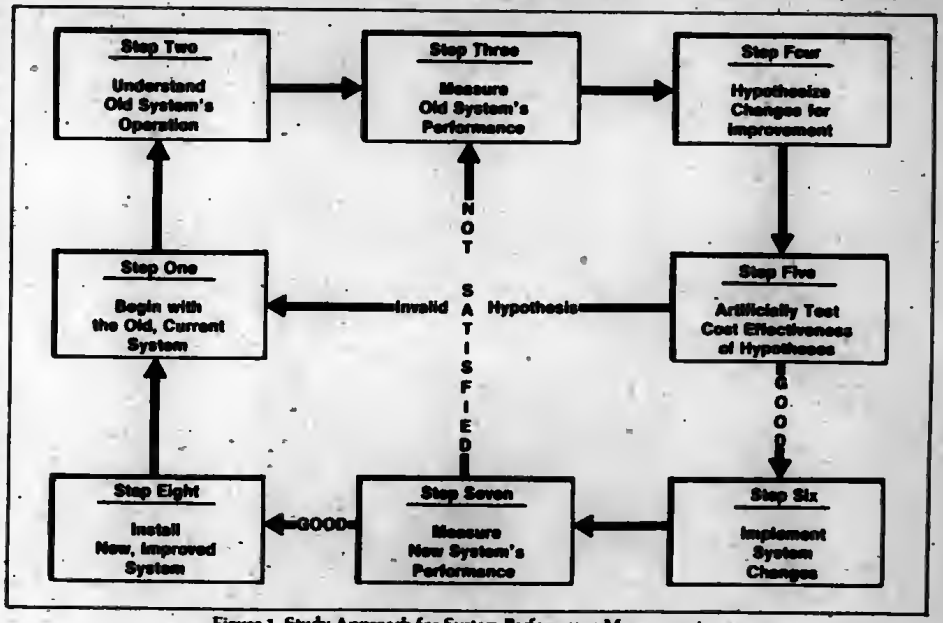

Figure 1. Study Approach for System Performance Management

IN DEPTH

(Continued from In Depth/31)

of typical packages.

Sections 5.0 and 6.0 give specific examples of automated tools, but the examples are limited to tools tailored for use with either DEC, Honeywell, IBM or Univac systems and to a few tools that can be used with nearly any computing system. The examples have been chosen for clarity of exposition. The mention or omission of a particular product does not imply a recommendation for or against its use.

Section 7.0 suggests how developers should make use of the many different tools and techniques for postprogramming testing in a dispersed environment. Some tools are inexpensive and can be used immediately, but others involve large investments and require careful and continuous planning.

2.0 — Environment

Suppose you are developing and maintaining software in an environment where there is great user independence and broad equipment diversity. Both users and equipment are geographically and organizationally dispersed, and many hardware vendors are represented.

This is what centralized development staffs face in many large firms and government agencies. These central staffs are unable to use software management techniques that depend on global standards and tight controls. Instead, they must adopt other methods of quality assurance.

2.1 — Users are independent and dissimilar.

In many decentralized organizations, local managers draw up automation plans, get central approval and then install their own systems. Since the central authority usually supplies at least some of the funding, it can influence the direction of local plans. But three factors prevent rigid centralized control and standardization:

- *Requirements.* The users are demographically and economically diverse, and they require different solutions for their automation problems.
- *Regulations.* Each user site must work within its local framework of laws and procedures.
- *Motivation.* People resist bureaucracy and regimentation. In government, there is a basic political issue of states' rights, with a tendency of all states to avoid federal control. In corporations, decentralized profit centers try to maximize their own performance, even at the expense of others.

2.2 — Users have very different computing equipment.

Local independence, differing requirements and a history of disorderly and decentralized development tend to leave a diverse array of computing systems installed at user sites. To allow for adaptation on site, the central staff must send out software in source language form, not in compiled or assembled object modules.

In correcting, converting, compiling or installing software, users strongly affect its behavior. The central staff has no direct control and little indirect influence on performance parameters of workload mix, system software or hardware configurations at user sites. Last, the staff receives only partial, second-hand performance data from the sites.

- *Many vendors are used.* In a recent study of a centrally maintained federal system, users in the states were found to have Burroughs, Honeywell, IBM and Univac computers, and many have peripherals and terminals from several additional sources. This variety is demanding enough, but it probably will grow worse. It is quite remarkable that Control Data Corp., DEC and other prominent vendors are not already in the lineup.
- *Computers vary in size and complexity.* Computer sizes tended to mirror state sizes. The IBM systems, for example, ranged from rather small 360/30s to the large 370/168s, and their operating systems ranged from the simpler DOS to the complex MVS.
- *Application languages are mixed.* Although the majority of the software was Cobol, there was also wide use of assembler language. Assembler language differs completely among vendors, and Cobol is not easily interchangeable among computers.
- *Users modify the software.* If the central staff supplies source code, users can change the programs, and they do so for three main reasons: (1) The central staff might maintain only IBM versions, so some users must rewrite programs to use them on Honeywell or Univac equipment. (2) Some

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users must change the software to meet special, local regulations. (3) Some users combine the centrally developed programs with significant locally developed enhancements.

• *Local support levels vary.* The central staff can't depend on a common level of local support. Local staffs vary greatly in size, experience, skills and work load.

2.3 — Old software problems are hard to fix.

If a central staff is not set up until after it can be justified by organization size or level of computing spending, then the new staff inherits lots of old problems. There are at least four reasons why a new central staff can't be expected to quickly fix all the old bugs:

• *Staff training.* The central staff did not write most of the source code. So the staff needs time to learn how the programs work before it can correct errors and make enhancements.

• *Unstructured design.* The central staff usually finds that the original developers used neither modern structured design methods that reduce the potential for errors, nor documentation formats that enhance maintainability. In fact, there might be no documentation at all.

• *Continual change.* The software cannot even temporarily stabilize; it must continue to change to meet national and state program requirements or competitive forces.

• *Problem backlog.* The software has many known problems and would still require a lot of work even if no more enhancements were needed.

2.4 — The central staff must adapt systematic methods to its unsystematic environment.

Faced with a heterogeneous and continually evolving environment, a central staff must reach for all available help to reduce complexity and bring order to its support task. The areas of greatest opportunity include:

• Modern programming practices.

• Standards, both de jure and de facto.

• Automated testing tools.

Programming practices are rapidly evolving because of the need to control software costs, reduce management complexity and prevent financial or human catastrophes caused by program bugs. In only a decade, we have advanced from Dijkstra's first exposition of structured programming ideas to the sale of packaged methodologies. However, most of these new software engineering tools are intended for specifying, designing and programming rather than for fixing already written software. So we will skip over them.

The standards area shows more promise. Even though it is hard to set standards in a dispersed environment, a central staff can take advantage of the trend toward standardization of all types of computing equipment. This trend, driven by growing cost and complexity, includes both formal and informal standards set by dominant vendors such as IBM, by dominant customers such as the federal government, by formal standards groups and by other interested parties.

Meanwhile, although new software may be flawlessly created and standards may be developed for tomorrow's computing systems, we still need to find out if existing programs work and, if not, how to fix them. This work might be called post programming software testing. Automated tools to do this work are the main subject of this report.

3.0 — Objectives

Most automated testing tools are expensive to install and use, different tests require very different tools and most tools are incompatible with each other. So careful analysis is needed to select from among them all. First, we need to decide what aspects of software behavior should be tested. Next, we need to know about the 10 different types of benchmark tests that are commonly made in the software life cycle. Finally, we should put all types of benchmark tests into categories and order the categories for priority in picking automated testing tools.

3.1 — The objective of software testing is to determine execution behavior.

Most computing professionals would agree that software testing means evaluation of active characteristics of programs executing in a computer system, as opposed to passive characteristics such as maintainability or development cost. They might also agree that

(Continued on In Depth/34)

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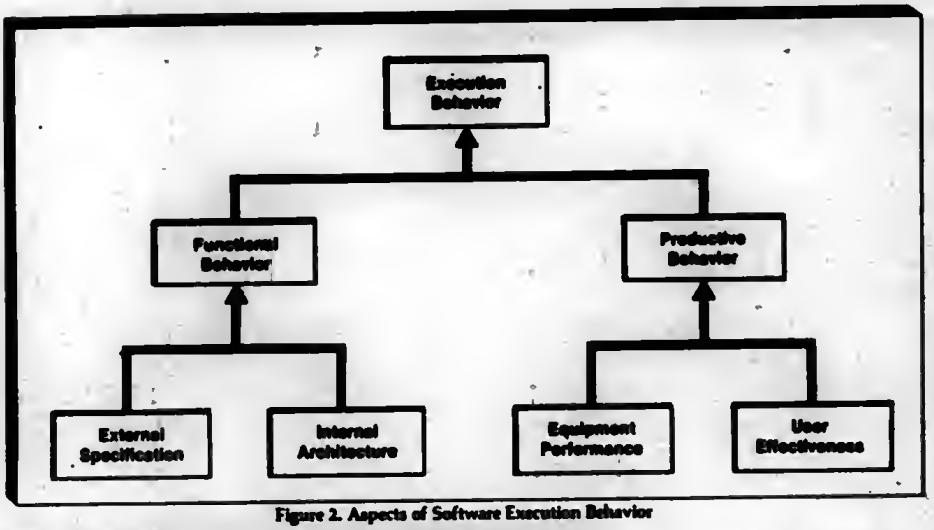

Figure 2. Aspects of Software Execution Behavior

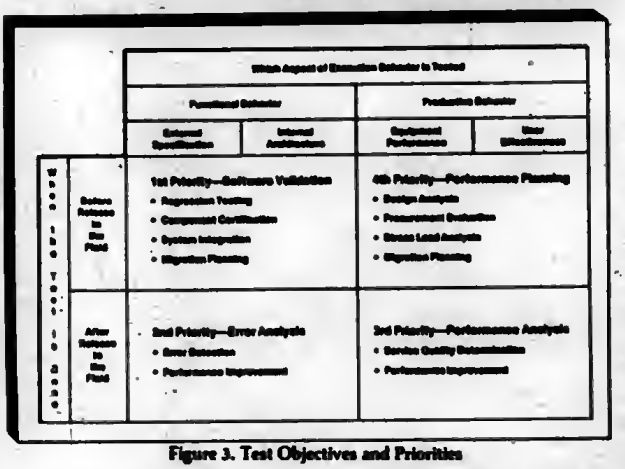

Figure 3. Test Objectives and Priorities

(Continued from In Depth/33)

the best approach to computer system testing is benchmarking — experimentally loading a system under controlled conditions to determine its execution characteristics. However, the same old pros might argue over exactly which characteristics to measure.

We will classify the aspects of software execution behavior as shown in Figure 2. This scheme follows from the two subject areas of a system specification:

- *Functional behavior.* The kind of work to be done by the system, or what output should result from a given input.
- *Productive behavior.* The amount of work to be successfully completed during an evaluation period, or how fast the system should process inputs and outputs.

In computing literature, testing the correctness of the functional behavior of computer programs is called software validation. Measuring productive behavior is called performance evaluation.

3.1.1 — Software validation should include separate tests for external and internal functional behavior. A complete functional specification has two parts. One defines the user's external view of the system. The other deals with the internal architecture that is the programmer's or engineer's view. A completed system could meet one specification but not the other.

Software validation should test both external and internal correctness. In so doing, since the two aspects are closely coupled, the chance of finding errors is greatly increased.

3.1.2 — Productivity depends on both the equipment and the user. Productivity in a DP system depends on both the performance of hardware and software and the effectiveness of associated human resources. Equipment performance has three aspects:

- *Throughput rate.* The volume of work that can be done during a fixed time interval.
- *Response time.* The interval between the time a particular item of work is submitted to the system and the time the system delivers the results.
- *Equipment availability.* The degree to which the system is ready when needed to do work.

User effectiveness has two aspects:

- *User convenience.* The ease with which a person can use the system to do work.
- *Level of training.* The degree to which the person is prepared to use the system.

Software performance results mainly from internal architecture, whereas user convenience depends largely on external design.

3.2 — Benchmark objectives change during the software life cycle.

Software developers now pay close attention to the life cycle concept. Federal Information Processing Standard 38 names the following life cycle steps:

- *Initiation phase.* Establishment of objectives and general requirements. Feasibility study and cost-vs.-benefit analysis.
- *Development phase.* Four stages, each with appropriate documentation: (1) *Definition stage:* determination of requirements for software, data and documentation. (2) *Design stage:* analysis of requirements and specification of system/subsystem, program and data base designs. (3) *Programming stage.* Coding and debugging software. (4) *Test stage.* Verification of execution behavior against design specifications.
- *Operation phase.* Maintenance, evaluation and change as more requirements are defined.

These phases are adapted from the familiar system life cycle of design and procurement, development and conversion, installation and startup, production and maintenance and evolution and redesign. Benchmarking can improve software quality during each phase.

At least 10 different types of benchmark tests can be named:

- *Design analysis test.* Reduces risk by predicting effects of design decisions before full implementation.
- *Procurement evaluation test.* Fairly compares competing bids by quantifying and standardizing the evaluation of complex, dissimilar configurations.
- *Component certification test.* Increases confidence in functional correctness by imposing rigorous workloads.
- *System integration test.* Verifies behavior of component interfaces through systematic, exhaustive exercises.
- *Service quality test.* Objectively documents in real time the level of service delivered to end users.
- *Stress load test.* Predicts the effect of future usage increases and determines limits of system capacity.
- *Regression prevention test.* Eliminates introduction of unintended errors during modification or maintenance by repeating standard tests that demonstrate not only that new features perform as desired, but also that all old features still work.
- *Error detection test.* Finds the cause of errors by recreating the errors as many times as necessary under controlled and instrumented conditions.
- *Performance improvement test.* Optimizes processing productivity by studying various system parameters under a range of loads.
- *Migration planning test.* Compares stability and performance effects on user software of new vendor hardware and software.

3.3 — All software execution characteristics cannot receive equal attention.

Figure 3 groups the different types of benchmarking according to two criteria:

- Can a central staff best achieve the test objective before or after programs are released to the field?
- Which aspects of execution behavior does the testing affect most?
- To select automated testing tools for the dispersed multivendor environment, we will use the following priorities:
- *First priority: software validation.* Rigorous regression testing to verify functional correctness. Includes migration planning related to computer operating systems.
- *Second priority: error analysis.* Emulation of field conditions in order to recreate, locate and correct functional errors discovered after release.
- *Third priority: performance analysis.* Direct quantitative measurement, evaluation and improvement of performance at user sites.
- *Fourth priority: performance planning.* Performance evaluation under laboratory conditions. Includes central staff activities to assist users in selection and implementation of systems.

Although all aspects of execution behavior are important in the long run, the basic technical and management facts of a dispersed environment usually force a central staff to focus its scarce testing resources first on functional correctness. Most users demand that the central staff achieve and maintain an adequate level of functional correctness before trying to maximize processing productivity.

4.0 — Techniques

The next three sections discuss com-

puter system benchmarking and related techniques for software validation, error analysis, performance analysis or performance planning. This section covers two topics briefly:

- *Workload components.* The mix of batch jobs and on-line transactions, the communication network through which the system under test receives the mix, the data files and the utility software to create and maintain the test workload.
- *Abstract methods.* Modeling, both analytic and simulation techniques.

Sections 3.0 and 6.0 cover two other topics in greater detail:

- *Alternative drivers.* Particularly remote terminal emulators that operate outside, inside or on the periphery of the system under test.
- *Differences in monitors.* The test outputs available from job accounting and analysis systems, application program optimizers and analyzers, system software monitors and hardware monitors.

4.1 — A benchmark test has four parts.

Thomas F. Wyrick does benchmarking at the Federal Computer Performance Evaluation and Simulation Center. He defines benchmarking as the process of experimentally imposing a test work load on one or more DP system components to determine selected execution characteristics of the components. Benchmarking is testing that is controlled and repeatable. Wyrick's definition implies that a benchmark test has four components as shown in Figure 4:

- *The system under test (SUT).* The complete collection of hardware and software to be tested.
- *The workload.* The benchmark mix of jobs, transactions, files and other inputs.
- *The driver.* The combination of tools and techniques used to apply the workload to the SUT.
- *The monitor.* The combination of tools and techniques used to observe, record and analyze the execution behavior of the SUT during benchmarking.

Although these four parts are clearly separate in concept, they are often confused in practice. For instance when testing application software, the hardware and system software are part of the driver, just the reverse of the usual hardware procurement benchmark where the hardware and systems software are driven by a work load of

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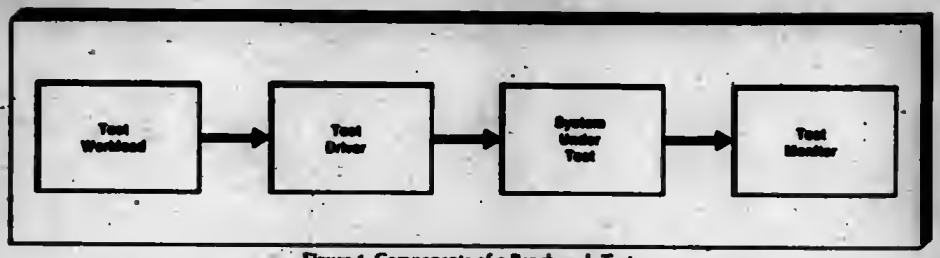

Figure 4. Components of a Benchmark Test

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(Continued from In Depth/35)

application jobs. And some systems have built-in test capabilities in which the driver and monitor are embedded parts of the hardware or software of the SUT.

4.2 — A large effort is needed to develop a meaningful test work load.

A benchmark work load has several parts, each of which could be expensive to create and then maintain in concert with software changes. Figure 5 breaks the work load into four parts:

- *The input mix.* A representative set of batch jobs or on-line transactions, including specific loading factors such as the arrival time distribution.
- *The initial data.* The data files in the SUT at the beginning of the benchmark. The input mix causes the system to read and update these data files.
- *An output standard.* A definition of the functionally correct benchmark result in terms of terminal scripts, data file contents and printer outputs.
- *Support utilities.* Programs for preparing the input mix and initial data, for initializing the SUT for the benchmark and for other necessary housekeeping tasks.

Probably the hardest part of preparing a benchmark run on a large transaction processing system is setting up the input mix. It is also hard to prepare the test data base against which the transactions are to be applied. Consider these requirements:

- *Breadth.* To test both internal and external functional correctness, the input mix should contain at least one instance of every transaction type, no matter how rare, and should cause execution of every program instruction except maybe some error abort paths.
- *Depth.* To test equipment performance and the performance implications of the internal architecture, the mix may need tens of thousands of transactions.
- *Accuracy.* Input timing must be specified and calibrated to be representative of what happens in the field.

In fortunate cases where the system is already up, we can capture an initial set of data from a production site and add to that data as necessary to meet special requirements.

4.3 — Modeling techniques can be used to test performance.

Software validation and error analysis require the actual running of software on a computer. But performance analysis and performance planning can be done abstractly with a model. A model has three advantages:

- *Increased understanding.* By abstracting essential features of a complex system into a simpler model, it becomes possible to understand the model and thereby improve understanding of the system itself.
- *Reduced cost.* Just as an automated driver can replace an actual workload, a model can replace an entire SUT to improve repeatability and reduce computer resource usage.
- *Greater flexibility.* A central development staff can vary a system model to represent conditions at any user site or even a site that does not yet exist.

There are two ways to model, called analysis and simulation:

- *Analytic modeling.* This method uses equations that allow direct calculation of system performance quantities from measured parameter values of work load, system structure and system scheduling algorithms.
- *Simulation modeling.* This method indirectly measures system performance quantities by observing the behavior of an imitative representation of the system.

Simulation can represent the system in greater detail than analytic modeling, but simulation is more expensive. Both methods have an extensive literature. Excellent tutorial surveys on analytic modeling appeared in *ACM Computing Surveys* for September 1978 and *Computer* for October 1978.

5.0 — Drivers

This section describes different kinds of automated drivers that can be used for benchmark testing, discusses some commercial products and raises some questions a central staff should answer before buying.

5.1 — Automated drivers improve benchmaking by reducing costs and increasing accuracy.

Running a batch job seems to be the oldest, simplest, least expensive and most popular benchmarking technique. A batch benchmark needs no special driver because batch systems are self-driving. However, batch jobs can't adequately test teleprocessing system behavior because batch work

does not test data communication performance.

The obvious way to benchmark a teleprocessing system is to assemble the required hardware complex (terminals, terminal controllers, front-end processors and host mainframes), load the system and application programs and staff the terminals with human operators who follow scripts prepared in advance. In theory, this live approach can accurately test any system by exactly recreating that system's environment. In practice, live benchmarking has three big disadvantages:

- *Lack of repeatability.* Humans make errors and cannot exactly execute split-second timing instructions.
- *High cost.* The live approach is both labor- and capital-intensive. It can cost more to run a benchmark than to actually run production because so much preparation and monitoring are needed.
- *Lack of flexibility.* Scripting, training and coordinating human terminal operators takes lots of time and trouble, and establishing physical communication links takes lots of money. So the number of different work loads and configurations that can be tried is limited.

The same issues of size, cost and complexity that discourage live benchmarking are also the reason why all four major categories of benchmark evaluation — software validation, error analysis, performance analysis and performance planning — are so important today in development work for large computer systems.

Benchmarking can greatly reduce system life cycle costs by improving aspects of computer resource control such as:

- Data center operation.
- System software tuning.
- Application program optimization.
- Equipment configuration management.
- Data file organization.

These cost-reduction opportunities have led to development of automated drivers to replace human operators and other costly test components and to gain repeatability and flexibility.

5.2 — The important difference between drivers is how much they are physically separate from, and operationally independent of, the SUT.

There are three types of benchmark drivers:

- *Internal driver.* A subsystem embedded within the SUT.
- *External driver.* A system completely separate from the SUT.
- *Mixed driver.* A system that has parts both internal and external to the SUT.

Figure 6 compares these three types with a batch benchmark. Figure 6 also hints at two complementary problems that usually govern the choice between automated drivers.

- *Distortion.* Internal drivers distort test results by consuming processor time, storage and other SUT resources.
- *Extra hardware.* External drivers require additional hardware.

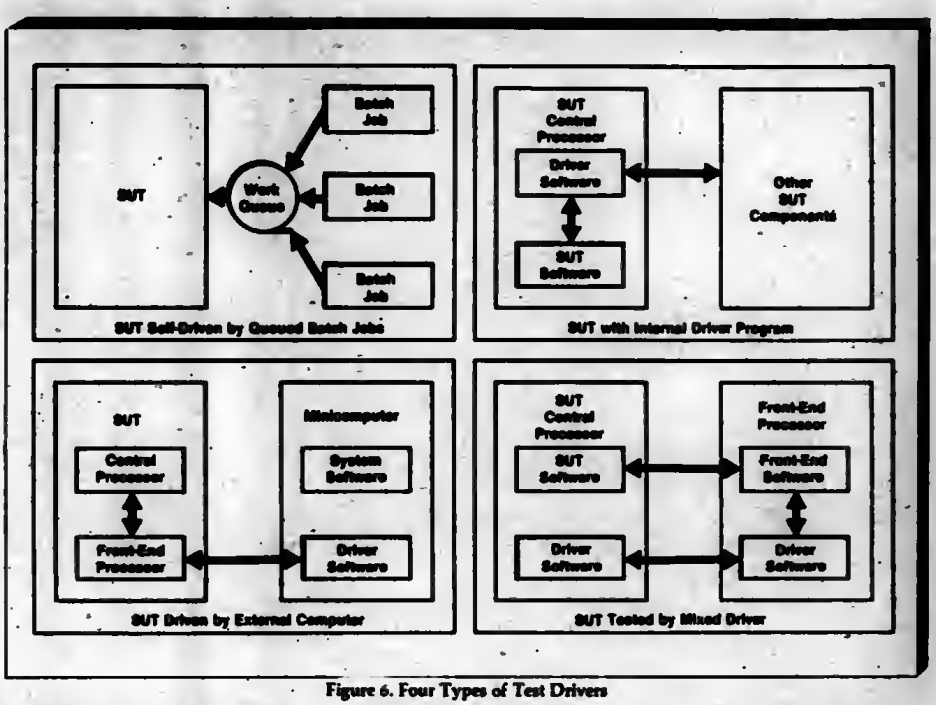

Figure 6. Four Types of Test Drivers

The degree of distortion caused by an internal driver differs depending on the work load level and on the aspect of execution behavior that is tested. An internal driver should change functional behavior very little. The external functions of applications should not change at all, but some internal architectural functions of the SUT may be disturbed if they depend on delicate timing or other close relationships with the operating system. Equipment performance could be severely degraded by an internal driver. The greater the test work load, the greater will be the distortion caused by an internal driver contending for resources. User effectiveness could be distorted to the extent that user convenience declines along with throughput, response time and availability.

The sure way to avoid distortion is to separate the driver from the SUT. But as separation increases, more hardware is needed to run the driver. So the basic trade-off between internal and external drivers is test accuracy vs. test cost and complexity.

At first glance, our four testing priorities favor an internal driver. First, the short-term testing objectives — software validation and error analysis — are not affected by an internal driver's distortion. Second, significant progress could be made in performance planning and analysis; only

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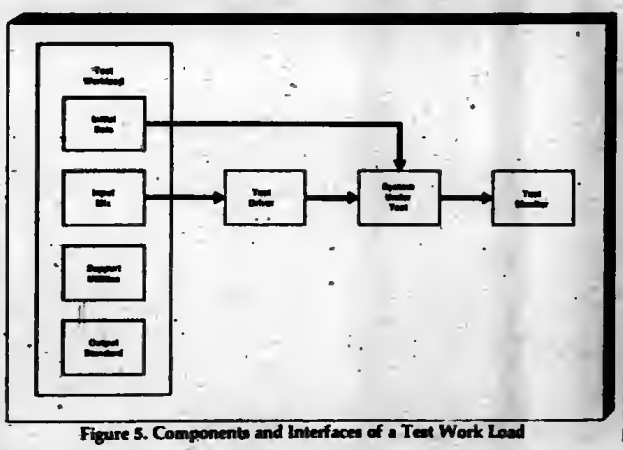
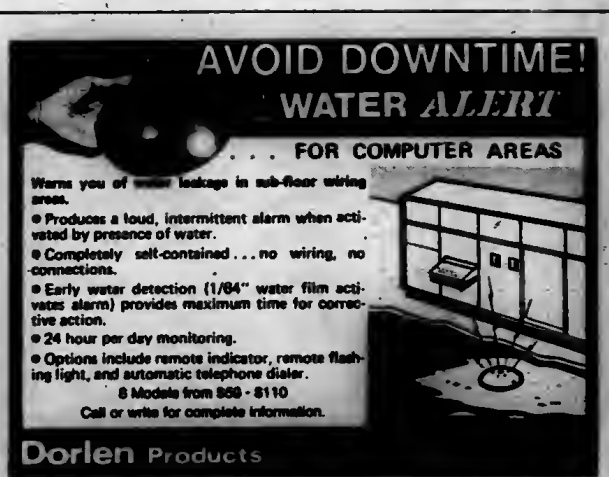


Figure 5. Components and Interfaces of a Test Work Load



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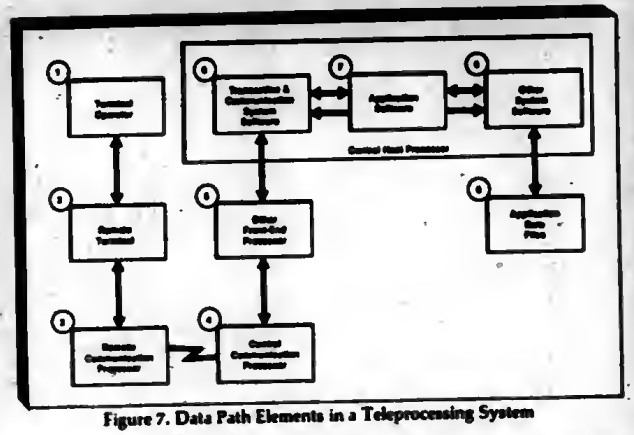

Figure 7. Data Path Elements in a Teleprocessing System

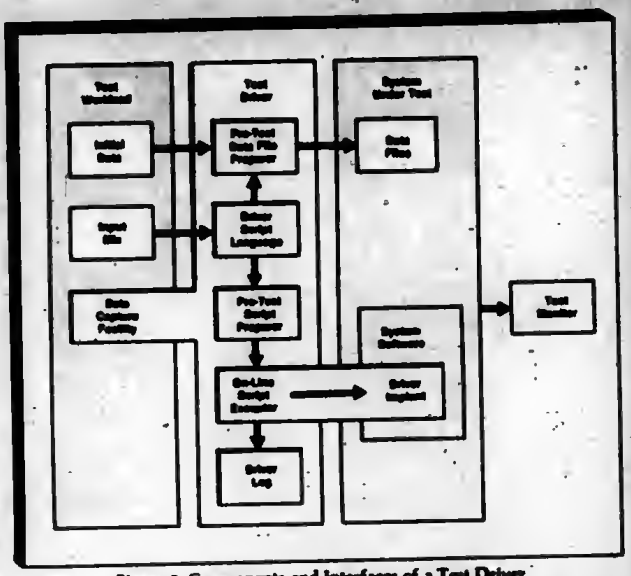

Figure 9. Components and Interfaces of a Test Driver.

(Continued from In Depth/37)

heavy stress tests and evaluations of other extreme conditions would be hindered. Third, using an internal driver can avoid extra hardware complexity and cost that might reduce the total amount of testing that could be done.

5.3 — Most drivers operate in the mixed mode.

Today's teleprocessing systems have several layers of system software and processors along the data path between a terminal operator and the central data files. This multiplicity allows many approaches to implementing a driver depending on what system components are treated as belonging to the SUT.

Systems architecture varies between DEC, Honeywell, IBM, Univac and other manufacturers, but Figure 7 fairly represents the average configuration. As distributed networks become more common, the situation will gain complexity, but the following discussion will still apply.

Conceivably, any combination of the nine system components shown in Figure 7 could be replaced by a driver to test some or all of the remaining components. Figure 8 shows five popular configurations.

- *CPU driver.* Resides in the SUT's CPU. Can be part of system software or application software or both. Intercepts outbound data streams and generates simulated inbound data. Most useful for testing application software.
- *Front-end processor (FEP) driver.* Resides in FEP. Like the CPU driver, but uses no host CPU resources. Can test entire host CPU, both system software and applications.
- *Message processor driver.* Like the FEP driver, but can test entire host configuration. Can emulate traffic in network with multiple message processors and hosts or can emulate traffic to and from multiple remote terminal complexes.
- *Remote terminal emulator (RTE) driver.* Like the message processor driver, but tests on-line system from completely external viewpoint. Usually implemented on a powerful minicomputer or another host CPU. Can emulate several remote terminal complexes at the same time.
- *Computer-aided instruction (CAI) driver.* Reverses the direction along data path of the four previous drivers. Usually implemented as an application program for training purpose. Can test user effectiveness.

The same conditions that generally favor internal drivers also particularly favor a CPU driver or a mixed CPU/-FEP driver. A driver that needs an additional CPU or FEP is more inconvenient or expensive to use than a driver that doesn't.

5.4 — A scarcity of drivers limits automated benchmarking.

A recent search for benchmark drivers found that few exist compared with other kinds of performance-related software packages. But this situation will change quickly because the U.S. government has just adopted a standard for RTEs to be used during federal computer system procurements. Computer manufacturers participated in developing the standard, are supporting its application and are even encouraging its use in competitive procurements outside the federal government. Further information can be obtained from GSA/ADTS/CDD, 18th and F Streets, N.W., Washington, D.C. 20405. Meanwhile, the search for drivers revealed that at least one internal CPU driver each exists for many DEC, Honeywell, IBM and Univac systems.

No comprehensive listing of drivers was found. Most automated drivers are still special systems for internal vendor use and are not yet commercially available.

A survey of more than 300 performance evaluation and improvement software packages in the December 1979 *EDP Performance Review* included no drivers. Its 1977 survey did list one driver, but that driver did not exist in packaged, documented, standard form and cost nearly $100,000.

Bureau of Standards Publication 500-4 discusses 12 drivers. But most of them either need a second large CPU, are for special situations, lack support or require extensive modification. The drivers discussed below were found one at a time through personal contacts and reading.

The search for benchmark drivers led

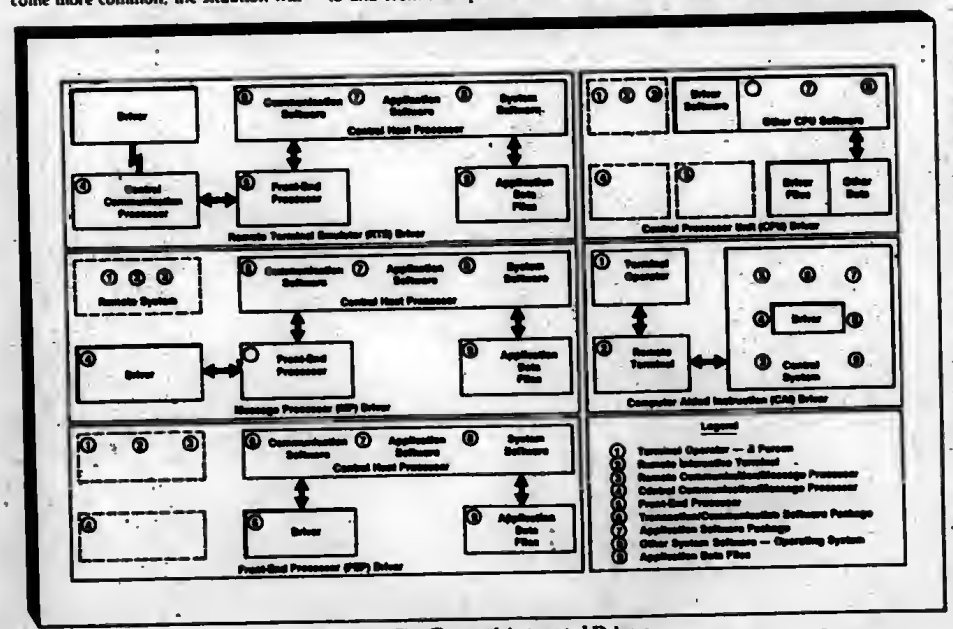

Figure 8. Five Types of Automated Drivers

to developing a model of their generic structure and desirable features. Figure 9 shows the basic parts and their connections:

- *Driver script language.* Speeds test development by permitting specification of scenarios in a procedure-oriented language. Can generate both deterministic and stochastic inputs, compare outputs and establish communication flows and timing relationships. Can describe terminal, line and network activity.
- *Pretest script preparer.* Compiles, translates or audits scripts off-line to prevent errors and increase efficiency in later on-line benchmark runs.
- *On-line script executor.* In an internal CPU driver, uses programming implanted in or added to the host operating system or application program, or both, to impose interactive, transaction or batch work loads on the host. Reads the prepared script from main memory or from data files.
- *Driver log.* Writes chronological benchmark record including driver inputs, SUT responses, times and other statistics.
- *Data capture facility.* Automatically builds scripts by collecting representative messages from live production system. Can capture and time-stamp messages and responses.
- *Pretest data file preparer.* Assists in creation of driver files and initial SUT files.

Not all drivers have these parts, nor are all these parts essential. They merely form an ideal list for evaluating drivers. The ideal driver should also have the following features to reduce the labor of preparing test work loads and monitoring test results:

- *Script power.* The next most desirable scripting feature after a data capture facility is a powerful, high-level script language with subroutines, a subroutine library and the ability to manipulate SUT responses.
- *Comprehensive outputs.* The driver should report results in meaningful ways, including a complete, chronological test log and response time statistics.
- *Management control.* A dynamic command facility can prevent wasted time by monitoring test progress, verifying driver behavior and modifying the test in progress, if necessary.
- *Easy installation.* The SUT should not have to be extensively modified to install the driver.
- *Broad repertoire.* The driver should be able to simulate a variety of terminals and communication configurations.
- *Realistic behavior.* The driver should stimulate user typing speed, thinking time between receipt of output and next input and other factors affecting the work load. This is important because when productivity is measured, queuing resulting from the distribution of work items is often more important than total work volume or SUT internal architecture.
- *Mix compatibility.* An internal CPU driver should run as part of the computer's normal work mix. Although stress tests and other performance measurements require all available computer resources, software validation and error analysis do not.

5.5 — Comparable internal CPU drivers exist for Honeywell, IBM and Univac systems.

Figure 10 (on In Depth/40) uses the criteria just listed to compare four drivers:

- *Analytics, Inc.'s tester internal test driver.* Tester runs as an overlaid task on the DEC PDP-11 under the RSX-11M operating system. Scripts are preprocessed, possibly on another system, before the test and then are interpreted by the driver. The scripts can test and change files, common variables and event flags in the SUT and the operating system.
- *Information System Consultants, Inc.'s (ISC) Load Generator (Loadgen).* Loadgen runs as a privileged batch program under Gcos on Honeywell Series 60 equipment. A Gcos core-resident module accomplishes all necessary Gcos interfaces. The module is dormant until activated by the batch program; then the module redirects messages that would otherwise pass through an FEP. The ISC driver supports several Honeywell systems: Transaction Driven System (TDS), Data Management IV Transaction Processor (DM-IV/TP), Transaction Processor Executive (TPE), Transaction Processor Executive II (TPE-II), Time-Sharing System (TSS) and Ex-

(Continued on In Depth/40)

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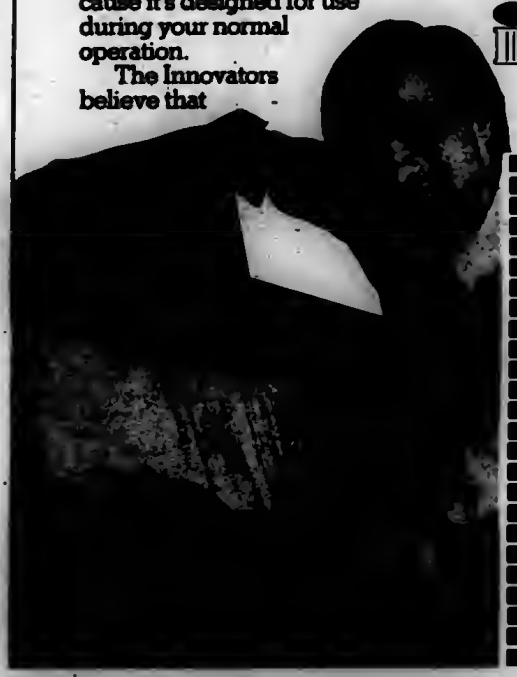

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IN DEPTH

	TESTER	LOADGEN	NAS	CS1100
Vendor and Full Name	Analytics' Internal Test Driver	ISC's Load Generator	IBM's CICS Network Activity Simulator	Univac's CS1100 Communications Simulator.
Price	$175 per Month per Site Free with Analytics Scripting Service.	$210 per Month per Site. $9,500 Purchase.	$105 per Month. Free after 12 Consecutive Months.	Free to All Univac 1100 Installations.
Installation	Packaged for Installation by User.	Packaged for Installation by User.	Packaged for Installation by User.	Packaged for Installation by User.
Maintenance	Maintained by Analytics, Inc., McLean, Virginia	Maintained by Information Systems Consultants, Inc. (ISC) Vienna, Virginia	Field Developed Product. Distributed "As Is" without Warranty.	Maintained by Univac.
Environment Required	Does Not Require a Dedicated Machine. Does Not Modify Operating System.	Does Not Require a Dedicated Machine. Can Run in Normal Mix. Modifies Operating System.	Probably Does Not Require Dedication, May Impede Other CICS Jobs. Modifies CICS Software.	Probably Does Not Require Dedication. Several Complex Options, Some of Which Modify Operating System.
Loading Power	Terminals Limited Only by Available Memory.	Up to 1,024 Simulated Terminals.	Terminals Limited Only by Available Memory.	Terminals Probably Limited Only by Available Memory.

Figure 10. Features of Four Internal Drivers

	TESTER	LOADGEN	NAS	CS1100
Terminal Types	Vendor Independent	Nearly Vendor Independent.	Most IBM Plus Teletype.	Most Univac Plus Teletype.
Script Limit	One per Terminal.	999 Different Scripts.	Up to One per Terminal.	At Least One per Terminal.
Controlled User Features	User Typing Speed, User Think Time, Logon Wait Time. Fixed, Random, or Actual as Captured.	User Typing Speed, User Think Time, Logon Wait Time. Fixed or Random.	User Typing Speed, User Think Time. Fixed, Random, or Actual as Captured.	User Think Time, But Not Typing Speed.
Data Capture	Comprehensive Facility.	None.	Comprehensive Facility.	Apparently None.
Script Language	Like FORTRAN with Structured Logic.	Assembler Macros.	CICS 3270 Simulator PEP. CICS Standard Sequential.	Like SNOBOL. Has Subroutines.
SUT Response Manipulation	Comprehensive Facility in Script Language.	Can Compare to String.	None.	Comprehensive Facility in Script Language.
Dynamic Test Control	Comprehensive Facility in Script Language.	Commands for Master and Monitor Terminals.	Commands for Control Terminals.	Unknown.
Driver Input Verification	Complete Driver Audit Trail.	Verify on Monitor Terminal, Compare Responses in Script.	Can Audit Input and Output by Terminal.	Complete Driver Audit Trail.
Statistics	Response Times. By Script.	Response Times. By Script.	Response Times. By Terminal	Unknown.

Figure 10 (Continued)

(Continued from In Depth/39)

tended Time-Sharing (ETS). In each case, the executive cannot tell a Load Generator load from a live, on-line load.

• *IBM's CICS Network Activity Simulator (NAS).* NAS operates as user modifications to CICS's terminal control program, task control program and (optionally) file control program and as a CICS task that processes NAS commands. Low overhead is claimed for NAS because CICS's own control logic performs the driving function without disrupting the normal sequence of CICS events. No other purely internal CPU driver for CICS was found, but Boeing Computer Services has one for TSO.

• *Univac's CS1100 Communications Simulator.* CS1100 has three parts: Communications Line Simulator (CLS), Remote Terminal Simulator (RTS) and Traffic Control Language (TCL). CLS is a set of 1100 Series Executive changes that simulates communications line data transfer. RTS is a high-priority user program that simulates the hardware of remote terminals. TCL is a language for writing scripts that simulate terminal operators.

5.6 — Each driver has its own additional costs.

An automated driver makes large, complex benchmark tests feasible because it cuts out the cost of real terminals and operators. But a driver brings along some other cost problems; it takes special training to operate and may need special hardware. Since these costs are largely fixed regardless of test size, while the costs of terminals and operators vary with test size, a driver succeeds only if the test is large enough to make the cost comparison favorable to the driver.

Each of the four internal CPU drivers — Tester, Loadgen, NAS and CS1100 — requires three kinds of work in addition to what the central staff already does:

• *Training.* The central staff must learn how to use the drivers. Each driver is a complex computer program that demands significant study.

• *Support.* Each driver must be installed and maintained. Since each is an internal CPU driver, each requires some modification of the host operating system. If NAS has bugs or needs changes, the central staff must do the work or pay to have it done.

Scripting. Each script language is actually a unique computer programming language. In addition to writing a test scenario and developing expertise in scripting, the central staff will have to maintain these special programs, an effort which could grow to be quite large. Costs for training, installation and maintenance are part of every tool, but costs for scripts are unique to the drivers.

If SUT software is written in a standard language that can run on any vendor's equipment after only minor changes, then software verification and error analysis need be done only once. Only one driver with one basic script is needed because functional behavior, in theory, does not vary between machines.

Your group may support multiple versions of software, one for each vendor in your environment. So your testing would require multiple internal CPU drivers, each with a different script. The test scenarios can be the same, but the actual script programs must be very different.

Since development and maintenance of several large scripts means a significant staff commitment, a better approach might be to write only one master script and automatically translate it for other drivers. However, after a cursory study of the documentation, it appears that the script languages for Tester, Loadgen, Nas, and CS1100 are so different that some translation can't be done automatically, and what can be done would require a programming effort equivalent to writing a compiler.

5.7 — Support costs may be high for NAS.

Since most attention is focused on IBM, let's look at the effort needed to install and maintain NAS. Some NAS users have voiced these complaints, which may be the result of naivete and subsequent disillusionment regarding the cost of benchmarking:

• *Difficult installation.* NAS installation requires an experienced technician to modify CICS tables.

• *Lack of IBM support.* NAS is officially unsupported. If the user is a small IBM account, even unofficial local support may not be given.

• *Unexpected problems.* Every software package contains some unpleasant surprises. For NAS, the problems appear to include a low practical limit on the number of simulated terminals because of job control language limits.

5.8 — Certain external drivers have significant advantages over the available internal CPU drivers.

There are at least two ways to avoid or reduce the work of scripting and maintenance for drivers. The first alternative is IBM's fully supported CPU/FEP driver, Teleprocessing Network Simulator (TPNS). Although only available to IBM customers since June 1976, TPNS has long been used internally to test IBM products.

As shown in Figure 11, TPNS can run as either an external remote terminal emulator or a mixed CPU/FEP driver. In either mode, TPNS needs a dedicated IBM 3705 transmission control unit (TCU), and the SUT needs another IBM-compatible TCU.

The TPNS software has two parts: one runs as a task under IBM's OS/VS

QUALITY ASSURANCE TOOLS

IN DEPTH

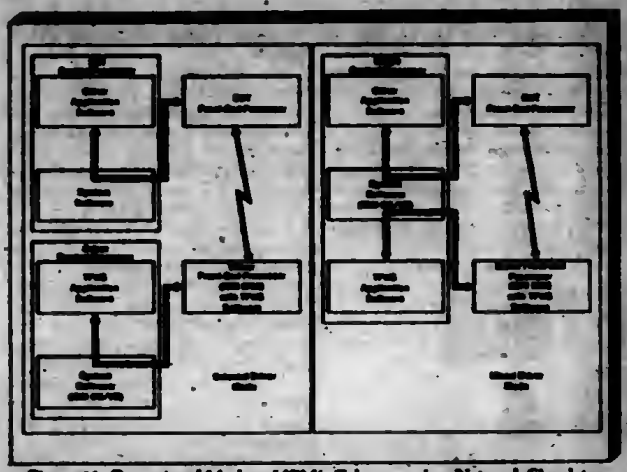

Figure 11. Operational Modes of IBM's Teleprocessing Network Simulator

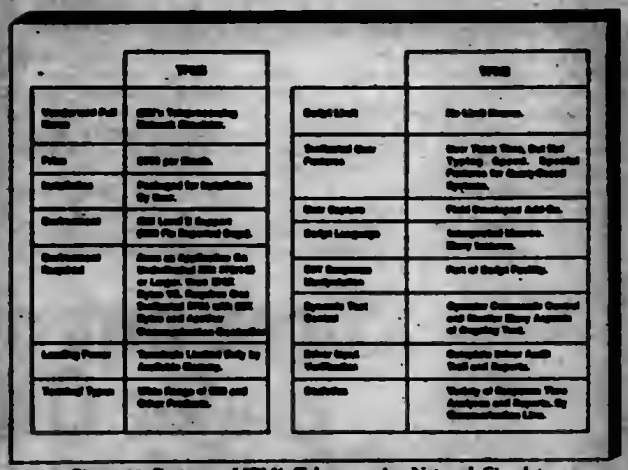

Figure 12. Features of IBM's Teleprocessing Network Simulator

system software, and the other replaces the usual 3705 software.

Figure 12 lists the features of TPNS. Comparing Figure 12 lists with Figure 10, one sees that TPNS is similar to Tester, Loadgen, NAS or CS1100. TPNS has better support than NAS but is relatively expensive. TPNS does not entirely solve the multiple script problem because, even when TPNS is used as an external RTE driver, it is still IBM-dependent. The SUT's FEP must be a communication controller that can support IBM protocols.

The second alternative is an external RTE driver that can thoroughly test almost any computer system and avoid most of the problems that come with multiple scripts. This driver, originally named the Automated System Evaluator (ASE), is being reimplemented and improved under the name Analytics System and Software Evaluator and Tester (Asset). ASE was developed in 1974 by Analytics of McLean, Va. for the Navy Electronic System Command (Navelex) and was successfully used to test some security features of the Worldwide Military Command and Control System.

ASE and Asset can run totally outside the SUT. ASE uses the Honeywell 716 minicomputer. Asset is being implemented on DEC's PDP-11 and VAX-11/780 minicomputers. ASE and Asset use higher level script languages than other drivers discussed here. ASE uses Please, a language with subroutines that closely resembles PL/I. Since Analytics' Tester internal driver forms the nucleus of the Asset external driver, they both use the same script language. The language resembles Fortran with additional logical structures and test-oriented tools. Figure 13 summarizes Asset's features.

6.0 — Monitors

The complexity of large, multiprogrammed teleprocessing systems makes it hard to measure the productive aspect of execution behavior. This creates a potential for significant waste of computing resources. Thus, a specialty called computer performance evaluation (CPE) is growing within the computer sciences. The object of CPE is to measure how well the software in a system uses the hardware and to suggest changes to improve equipment performance and other aspects of execution behavior.

Specialized tools for CPE have been around for about 10 years. The first tools, called monitors, addressed a broad range of CPE questions from the complexities of internal system software behavior to more apparent external behavior.

Today's monitors are more specialized, and many are offered. The problem is to find a compatible set of monitors that meet your requirements.

In addition, most of today's measurement or monitoring tools were designed for performance analysis and don't effectively address software validation and error analysis. Worse, many tools are closely tied to a particular vendor's equipment and monitor system software rather than application jobs. Still, some excellent products exist.

We defined a test monitor as a collection of hardware and software tools and techniques used to observe, record and analyze SUT execution behavior during benchmarking. The tools can be picked from many sources. At least 50 vendors offer products in one or more of the following seven categories:

- *Job accounting facility (JAF).* A JAF is an operating system feature that gathers data concerning system resources used by programs running on the SUT. The data is later analyzed by an application package for billing or performance studies.
- *JAF data reduction package.* JAF data reduction is most often done with a user-written or third-party software package. The typical package produces an array of standard reports and builds a historical data base for later time-series analysis. Some packages also process software monitor outputs.
- *Software monitor.* A software monitor is a computer program running in the SUT that collects and reports data on the state of the SUT during operation. Such a monitor usually requires modification or extension of the operating system and may include a high-priority application program. A software monitor gathers data from internal operating system tables and control areas and from machine status registers and indicators.
- *Hardware monitor.* A hardware monitor is a physical device that samples, records and usually analyzes the electrical impulses inside the SUT. The monitor includes cables, probes to at-

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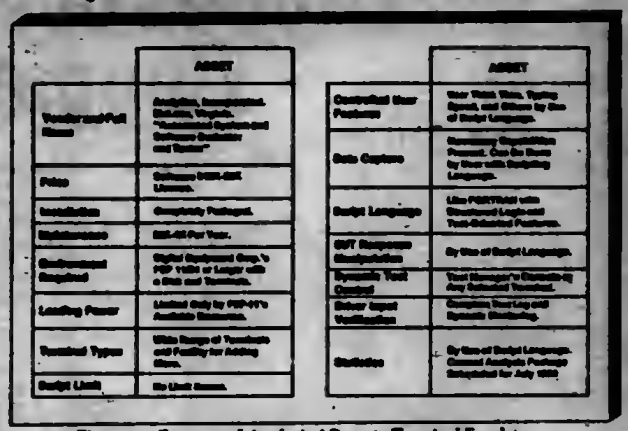

Figure 13. Features of Analytics' Remote Terminal Emulator

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IN DEPTH

(Continued from In Depth/41)

tach to the computer, counters and data recorders. Recent hardware monitors include a minicomputer to analyze the recorded data.

• *Application program analyzer.* This is a software package that examines execution behavior of application programs at the source-code level in order to provide data to assist in program optimization. An application program analyzer usually monitors program execution to obtain execution counts and timings for each source language statement.

• *Source standard auditor.* This auditor is a program that checks source syntax before compilation to enforce programming standards, which are rules established to simplify development and maintenance, minimize errors and control costs.

• *Data file analyzer.* This program inspects data files before and after a benchmark test to validate the efficiency and integrity of file structure and content.

These seven tools can be used together to monitor a benchmark test as shown in Figure 14. Not all of them should be bought at once, if ever. Hardware monitors, especially, are quite expensive and not well suited to a dispersed environment. On the other hand, hardware monitors have unique advantages, and a study of these advantages leads to better understanding of other tools such as software monitors.

6.1 — The job accounting facility is the starting point for studying system behavior.

The JAF has four advantages over other types of CPE tools. For these reasons, CPE should begin with a JAF analysis before other specialized tools are used.

• *Low cost.* Most computer vendors supply a JAF as part of the operating systems at no additional cost.

• *Vendor support.* The JAF has strong vendor support for reliability, documentation and training.

• *Breadth.* The JAF is general-purpose. Since it reports usage of system resources by individual job, JAF output can help to evaluate all four major aspects of execution behavior.

• *Extensions.* Many third-party firms sell data reduction packages to squeeze maximum benefit from JAF outputs.

All major vendors have a JAF. Honeywell's Gcos facility is the Statistical Collection File (SCF). IBM has the System Management Facility (SMF) under OS and Univac's 1100 series systems write a Master Log File (MLF).

Each JAF produces a file with many types of records generated by system events such as normal step terminations, abnormal job terminations, user logons or channel request. The existence of standard JAF output has created a market for data reduction packages that translate raw JAF usage statistics into more usable forms. The primary uses are to bill system users in dollar amounts and to evaluate system performance, but not all packages do both.

Some packages can accumulate and maintain a data base to allow analysis of usage over periods of weeks or months. Some packages have a generalized report writer along with their series of standard reports.

Boeing's Systems Analysis and Resource Accounting (Sara) package is a good example of a comprehensive system with features useful in a dispersed environment. Sara has three parts:

• *Basic Sara system.* Translates and reorganizes raw JAF data into standard reports and a historical data base.

• *Sara management reporting.* Uses the historical data base to produce, in both tabular and graphic form, analyses of trends and projection of requirements for more than 50 system variables.

• *Report writer.* Enables the user to produce customized reports.

Sara is widely used, especially in the military community, and has full Boeing support. Although prices vary between versions, a complete Sara system including first-year maintenance costs from $13,000 to $16,500 per site, with volume discounts available. Further maintenance costs $2,000 per year. Boeing also offers partial systems, training classes and installation support. Sara has three features that are important in a dispersed environment:

• *Multivendor coverage.* Boeing offers similar versions of Sara for most Honeywell, IBM and Univac main-

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frames. The main advantage is reduced training and support cost. In contrast, Univac has the Log Analysis, Statistics, Summary and Other (Lasso) package and prepares reports. But it is a nonstandard package that does not have full Univac support and, of course, only works for Univac systems.

• *Partial portability.* Although a particular copy of Sara, say the Sara-IV-IBM for an IBM 370/145, may run at only one site at a time, that copy can process SMF tapes from any IBM machine at any other site. That is because Sara accepts a configuration deck describing the computer that produced the SMF output. The advantage is that a central staff can get objective information concerning the state of remote computers.

• *Compatible software monitor.* CICS-Monitor is a Sara-matched CICS software monitor offered by Boeing for $6,000. CICS-Monitor can provide data needed to improve the teleprocessing software.

6.2 — Hardware and software monitors gather data unavailable from job accounting facilities.

After an initial CPE study with a JAF and a JAF data reduction package, there are usually unanswered questions that require data that is unavailable from the JAF. A hardware or software monitor might then be used to supplement the JAF. All three types of tools mainly measure processing productivity. They can help to indirectly determine the functional correctness of internal system architecture, but they offer little help in determining functional correctness according to external specifications.

6.2.1 — Hardware monitors only observe the system under test, but software monitors interfere with it. Differences between hardware monitors and software monitors are easy to understand. A hardware monitor is a passive physical device, perhaps programmable, that attaches to the SUT but uses no SUT computing resources except possibly for post-test data reduction. A software monitor depends totally on the SUT for computing resources. There are both time and event-driven software monitors:

• *Time-driven.* Samples SUT status data at user-specified intervals, gaining control of the SUT through interrupts from the SUT's clock.

• *Event-driven.* Captures data at every occurrence of the events specified for study.

The design differences between hardware monitors and software monitors cause striking operational differences:

• *Overhead.* Many software monitors are high-priority, permanently loaded programs that reduce available memory. They typically consume only a small portion of total SUT power, but they can hog the whole machine if you ask for too much output. Hardware monitors have their own CPU and consume no SUT resources.

• *Integrity.* Software monitors may have bugs or cause timing changes that lead to failures in the SUT's operating system or applications.

• *Measurements.* Software monitors can't measure concurrent events and cannot accurately measure their own overhead, and hardware monitors can't measure logical conditions such as the length of system queues.

• *Accuracy.* Time-driven software monitors depend on sampling methods so their accuracy depends on sample size and frequency. Time-driven monitors see other programs only in an interrupted state when certain facts may be hidden.

• *Resolution.* Hardware monitors depend on their own cycle speed, while software monitors depend on the resolution of the SUT clock.

• *Ease of use.* Software monitors provide a standard set of immediately usable outputs. Hardware monitors require time to attach the physical probes, which may have to be moved for new tests.

• *Interpretation.* Hardware monitors are good at revealing *what* is happening, but poor at revealing *why* an event is occurring. Software monitors can't observe all the physical events, but they can access the logical information in the machine by reading the memory and files.

The JAF and hardware monitor tools are fundamentally different, so their results are hard to collate. JAFs measure application programs, while hardware monitors measure physical devices. Neither type pays much attention to system software that joins jobs to the machines.

In fact, a JAF is really an event-driven software monitor. Since such a monitor at any price is more expensive than the free JAF from the computer vendor, a software monitor must justify its cost by producing better information.

Just as JAF data needs reduction and analysis, so does data gathered by monitors. However, unlike the JAF case, no large market exists for independent data reduction packages. Monitor data output interfaces are not widely standardized like those of JAFs, and monitor vendors bundle data reduction software with the monitors.

6.2.2 — Hardware monitors and software monitors exist for most computer systems. A hardware monitor can usually be used on any computer once a library of probe points has been developed. But a software monitor must be closely mated with the operating system and can be used on at most one vendor's equipment (and some plug-compatible replacements) and often on only part of that vendor's product line.

Hardware monitors are sold by Computer Performance Instrumentation, Computer Resources, Inc., Comten, Inc., International Marketing and Consulting, Inc. and Tesdata Systems Corp. This list will grow, and computer manufacturers will begin to offer built-in monitors.

Although software monitors exist for most computer brands, the tools differ in their approach and emphasis, are hard to compare and have unequal support. Univac offers an event-driven monitor, the Software Instrumentation Package (SIP), as a standard product. It has five levels of operation, each producing more detail but requiring more resources.

No commercially available software monitors are known for Honeywell 6000 Series equipment, but two might be considered if a central staff can support them:

• *Generalized Monitor Facility (GMF) from the Department of Defense.* GMF contains eight different monitors. Seven of these — for main memory, mass storage, CPU, tape,

(Continued on In Depth/44)

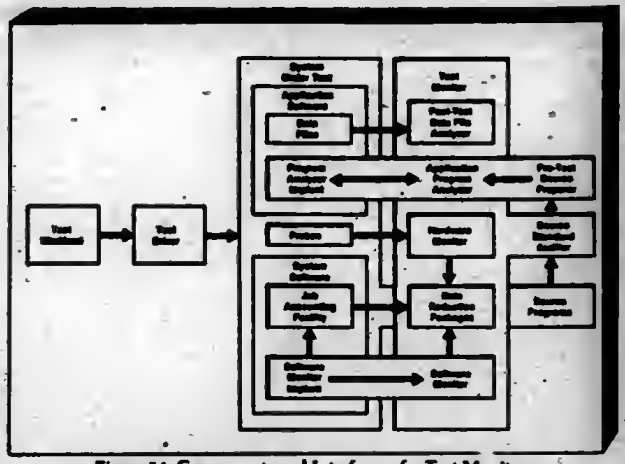

Figure 14. Components and Interfaces of a Test Monitor

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channels, communications and special tuning — are event-driven and utilize the normal Gcos trace in the System Dispatcher Module. The eighth is time-driven and samples system queues and tables at user-selected intervals. GMF is maintained by the Computer Performance Evaluation Office of the Defense Communication Agency's Command and Control Technical Center.

• *System Resource Utilization Package (Syrup) from the U.S. Air Force.* Syrup is a time-driven monitor that samples system queues and tables for data about the mainframe, peripheral devices and communications. Syrup writes special records to Honeywell's JAF, and Boeing's Sara-H has been upgraded to integrate Syrup data with the normal SCF outputs.

IBM itself offers a variety of monitors. Besides the Systems Management Facility (SMF), IBM has the Resource Management Facility (RMF) and the Generalized Trace Facility (GTF). SMF and GTF are event-driven monitors, but RMF is both event- and time-driven.

SMF records application program resource usage — not operating system usage — at job and-step terminations, so SMF is a JAF. GTF records data for operating system events such as supervisor calls. RMF measures the OS/VS2 MVS operating system and not only records event data but also periodically samples passive data such as queue lengths.

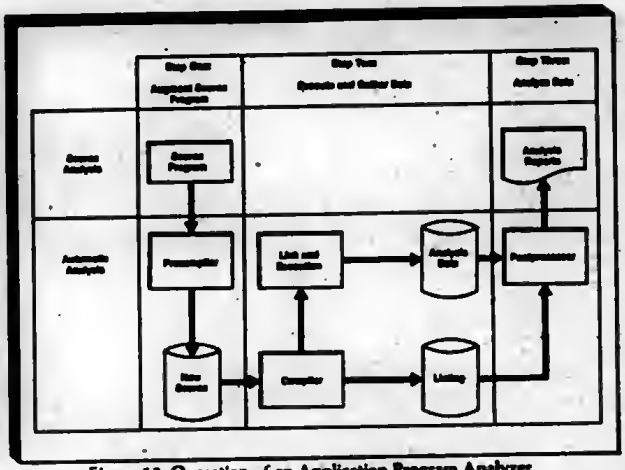


Figure 13. Operation of an Application Program Analyzer

Many firms sell software monitors for IBM systems, and some products are highly specialized. Four were designed specifically for measuring CICS, and there are others like these: CICS/VS Performance Analyzer II from IBM; Performance Analysis Display System from On-Line Software International; CICS Utilization Monitor from Johnson Systems; and CICS-Monitor (CICS-MON) from Boeing Computer Services. Again, the Boeing product is a good example.

• *CICS-MON is both time- and event-driven.* At user-specified time intervals, CICS-MON gathers data from system control blocks. At transaction termination, it records transaction activity. It can also record transaction activity at user-specified intervals during lengthy transactions.

• *CICS-MON displays data both on- and off-line.* It offers immediate on-line display for any terminal and the operator's console and has a general analysis and reporting feature for later off-line display.

• *CICS-MON has a Sara IV interface.* Sara IV can integrate CICS-MON data with SMF data. When purchased this way, CICS-MON costs $4,500 for a one-site, perpetual use license.

• *CICS-MON installation requires no CICS modification.* Boeing claims that installation is quickly accomplished by merely loading certain files and relinking CICS.

6.3 — Other monitoring tools focus on application source code and data base files.

The first four categories of monitors — JAFs, JAF data reduction packages, software monitors and hardware monitors — work at the system level. The remaining three — application program analyzers, source standard auditors and data file analyzers — largely ignore hardware and system software to focus instead on the application.

The fact that poorly written programs and badly designed files can waste much compoter power, together with the fact that the quality of programmers varies widely, has created a market for tools to identify and correct inefficiencies in application software. The tools take many forms: precompilers, optimizing compilers, postcompilers, preassemblers, optimizing assemblers, postassemblers, optimizing linkers and others. In general, they do one or more of the following:

• *Coding analysis.* Static analysis of source or object code before execution.

• *Execution tracking.* Dynamic analysis of source or object code by producing statistics on the frequency of execution of program statements and on other aspects of coding efficiency.

• *Coding optimization.* Use the results of a static or dynamic analysis to modify the coding, thus producing new code with specific inefficiencies removed.

6.3.1 — Source standard auditors do coding analysis. The auditors category includes packages for static coding analysis and other tests that precede program execution. Some examples are Spark/Codeanalyzer from Burroughs Corp., Metacobol from Applied Data Research Inc., Help/Rebl from Advanced Computer Techniques Corp. and Data Catalogue 2 from Synergetics.

6.3.2 — Application program analysers do execution tracking and coding optimization. These tools dynamically analyze source or object programs by tracking and timing the execution path through the individual program statements.

An application program analyzer can serve all four of our testing objectives. For software validation, for example, an analyzer can verify that the benchmark work load causes every program statement to execute. For error analysis, one can see what part of a program is executing. For performance analysis and performance planning, one can study the frequency of execution of statements to determine what part of a program to optimize. As a rule of thumb (the "80/20 rule"), 80% of computer usage is accounted for by only 20% of the program statements.

Many analyzers include or interface with an optimization package, but optimization of source or object coding depends on many local factors over which a central staff has almost no control. These factors include vendor-, version- and site-specific features of compilers, linkers and operating systems; hardware configuration and availability; allocation of main memory and direct access storage; and priority assignments. Of course, a central staff can help users with optimization by doing coding analysis and execution tracking and publishing the results.

Among the many application program analyzers, Cotune II from Capex Corp. provides a clear example of how an execution tracking package operates. Cotune II tracks a Cobol program's execution and prints an annotated source listing showing how many times each statement was executed and how much CPU time it used.

Cotune II analyzes a Cobol program in three steps as shown in Figure 15. First, the Cotune precompiler reads the

Cobol source program and augments it with measurement statements to produce a new, enlarged source program. Second, the augmented program is compiled, linked and executed. The augmented program produces results identical to the original except that it also accumulates measurement data. The embedded measurement statements act like an event-driven software monitor for source-level events. Third, the Cotune postprocessor analyzes the measurement data and correlates it with the original source listing to produce reports.

6.3.3 — Data file analyzers are often part of one of the other six types of benchmark monitors. This program does not have a distinct identity in terms of implementation method or mode of operation. In other words, some data file analyzers are part of software monitor packages, some are source standard auditors and application program analyzers, simply unique utilities for supporting the testing of a particular SUT.

What sets this category apart is its focus on data files. Just like monitors that focus on source coding, data file analyzers can do static analysis, dynamic analysis and optimization.

The subcategory of data file analyzers that do static analysis includes many interesting types:

- *Static analysis relative to source code.* This type includes the cross-reference generators that produce listings of data elements used in files, programs and systems and identify where the data elements are used.
- *Static analysis relative to hardware.* This type focuses on how files are allocated to channels, disks and tapes as a first step in optimizing that allocation.
- *Static analysis independent of programs or hardware.* This type examines data definitions, relationships, structures and formats for consistency, validity and efficiency. This subcategory ranges from simple user-written programs that perform benchmark postmortems, cleanups and reorganizations on a particular file to complex systems that use elaborate computer science theory.

Most data file analyzers for dynamic analysis seek information that helps to optimize the use of hardware. For example, the Air Force's Removable Disk Pack Monitor-Version I (Pakmon I) is a sampling monitor for Honeywell systems. It reports which packs are allocated to each removable disk spindle, the state of the spindle, the number of users, the type of pack allocated and whether the pack is actually mounted. Boole and Babbage's Data Set Optimizer reports space actually used on a pack, reports head movement by data set and suggests pack reorganizations to reduce contention and seek times.

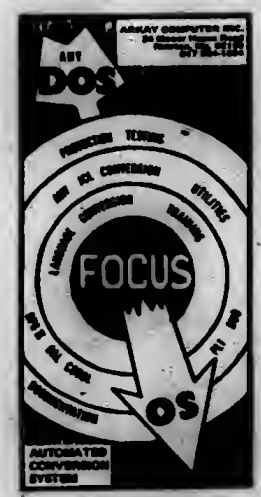
7.0 —Conclusions

Today's tools and techniques for testing application software are imperfectly suited to the conditions of a dispersed environment, yet they offer many opportunities for improving software quality. In fact, the diversity and complexity of today's tools pose a challenging problem of selection, installation, training and maintenance.

7.1 — The central staff needs a long-range plan.

Any comprehensive program of automated software testing takes a large investment. To ensure a maximum return on that investment, the central staff should prepare a detailed master plan. In system life-cycle terms, plan-

(Continued on In Depth/48)



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(Continued from In Depth/45)

ning is part of the initiation phase, to be followed by development and operation phases.

Federal Information Processing Standard 64 describes the analysis needed in the initiation phase. Figure 17 shows the key activities. In the language of the standard, this report is a feasibility study that includes the following:

- *Objectives.* Analysis of the objectives, requirements and system concepts.
- *Alternatives.* Evaluation of different ways to reasonably achieve the objectives.
- *Approach.* Selection of alternative.

In addition to the feasibility study, the central staff should do a cost/benefit analysis, looking first at drivers and then at the other tools in the master plan. Since all tools shown in Figure 16 must fit together, the choice of a driver influences all other decisions.

This planning should not be a one-time effort. Technology and needs change, and so must the master plan. The central staff should review plans annually.

7.2 — Testing tools must match the environment.

Now let's contrast the problem of a central staff in a dispersed environment with the more common problem of maximizing performance of a single computing center. A computer center manager might change the priority of our four testing objectives as follows to emphasize hardware and system software, not application software: first, performance measurement (with subsequent tuning), followed by error analysis, performance planning and software certification.

Many of the available tools were developed for or by such a manager rather than for application developers. So some tools are less powerful in a dispersed environment than in a centralized one. Although no detailed analyses have been done, Figure 18 suggests how the benefit-to-cost ratio of certain tools evaluated in a dispersed environment might compare with the other situation.

With enough resources, a central staff could build an integrated testing facility as shown in Figure 16. The facility would be even more complex than shown because separate software monitors and other vendor-specific tools would be needed for DEC, Honeywell, IBM, Univac and other mainframe systems. Although every tool and technique could be valuable in some way, the ratio of benefits to costs of a particular tool may be unfavorable in the dispersed environment.

7.3 — The central staff should quickly acquire and use some of the standard commercial test monitors.

The central staff should not wait to complete the master plan before acquiring tools. The first step should be to buy some of the commercial monitors, particularly JAF data reduction, software monitor and application program analyzer packages. Given the stability of JAF definitions, it is likely that any reasonable master plan would include these tools in an early phase.

These packages offer immediate, broadly applicable benefits at modest costs, and they can provide experience that is helpful to the master planners. The packages are not very expensive. So even if the master plan takes another direction, little is lost by abandoning one tool for another after a year's use.

- *Applicability.* An application program analyzer can help with all four major testing objectives and can be used for both development and maintenance.
- *Growth.* The JAF and an application program analyzer are the proper starting points for automated testing. They can indicate a direction for further work and grow with that work.
- *Investment.* Many packages can be licensed for a lifetime fee of $10,000 or less.

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Steve Coit, Manager of Business Analysis for Prime, notes that "In our business, changes in customer needs and technology happen very quickly. We must anticipate and respond to these changes to remain competitive That's crucial, considering our exceptionally high growth rate. We've managed to double our size every one or two years since 1975. This growth has demanded that our top management track closely the capacity, staffing, and financial requirements of the company."

Steve Coit

"When internal and external changes come quickly to a company, decision makers need the ability to explore a wide variety of scenarios. "Since IFPS lets us ask 'What If?' about almost every aspect of our strategic market plans, including competition, technology, and customer base, we can respond quickly," Coit said.

He continued, "IFPS has increased our group productivity dramatically. The programming and maintenance load of traditionally programmed models would leave us little time for analysis. With IFPS, our model development is frequently done in a few hours and IFPS models are virtually self-documenting. We can spend our time discussing and analyzing alternative strategies with decision makers instead of debugging and documenting programs."

"For the past year, we've been using IFPS to revise our forecasts routinely. And we use IFPS for ongoing maintenance of our budgeting model, too. Having that kind of high level day-to-day support is quite important to us," he said.

To provide IFPS capabilities to as many people as possible at Prime, the Business Systems Group manages a network of Prime computers which are used for all the company's data processing requirements. Planners from every organization in Prime can access IFPS through the corporate computer network. IFPS models which "converse" over the network are one more way that managers from different parts of the company can communicate and plan together.

Coit remarked that IFPS is a natural application on Prime computers. "Our computers bring quick-response interactive mainframe capability to users at low cost, and IFPS is a highly interactive, easy-to-use package. The fit is perfect," he said.

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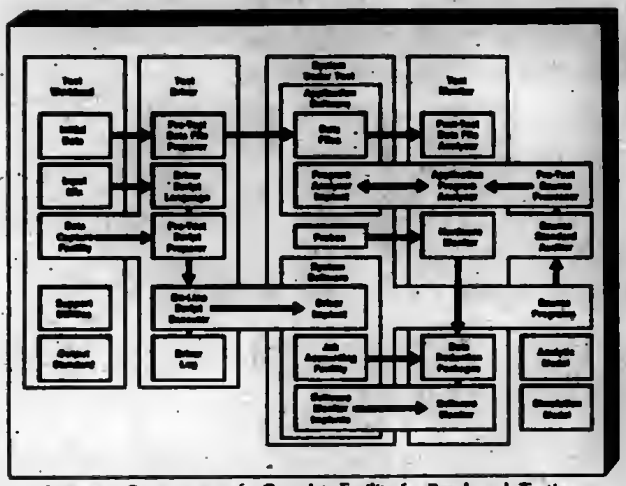

Figure 16. Components of a Complete Facility for Benchmark Testing

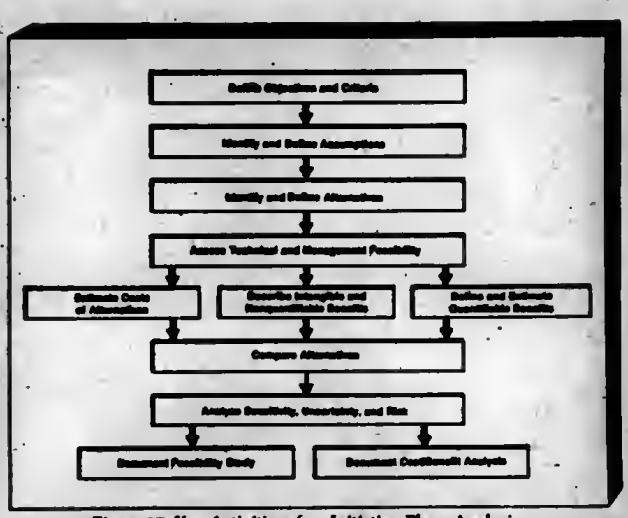

Figure 17. Key Activities of an Initiation Phase Analysis

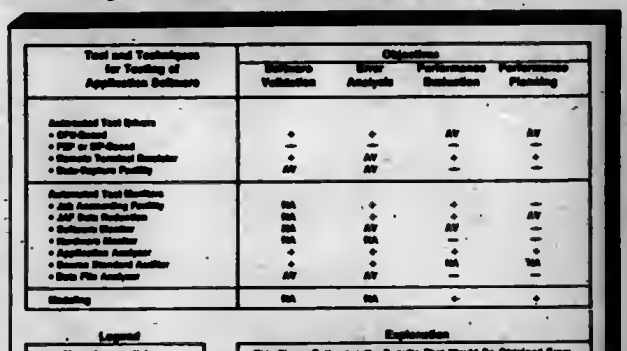

Figure 18. Relative Value of Testing Methods When Used in a Dispersed, Multivendor Environment

• *Maintenance.* The vendor usually maintains the package for an annual fee of $2,000 or less.

• *Installation.* Most packages are ready for quick installation or are installed by the vendor.

• *Training.* These packages are usually well-documented, courses are available and the instruction needed is not great.

• *Startup.* There is no need to prepare any large amount of material such as scripts or special programs. Startup should be immediate.

7.4 — The central staff should study the detailed costs and benefits of vendor-specific drivers vs. a general-purpose remote terminal emulator.

After the central staff installs the first few monitoring tools and gains skill in their use, the next tools to look at are automated drivers. The choice of drivers is a key cost and strategy decision.

• *Alternatives.* The choice is between one or more CPU drivers like Tester, Loadgen, NAS and CS1100, and a single, independent RTE like Asset. Asset has higher initial investment costs, but its life cycle cost including staffing could be much lower than for multiple CPU drivers.

• *Preparations.* No matter which driver is chosen, much more time and effort are needed to install and activate a driver than a set of monitors. More training is needed, and scripts must be written. Benefits are seldom immediate.

• *Cost.* Because of the need to write and maintain scripts and to modify operating systems or acquire additional hardware, life cycle costs of test drivers probably exceed the total of all other testing costs, except for a large modeling effort.

• *Strategy.* Choosing internal CPU drivers, each with its own unique script language and nontransferable skill requirements, represents a short-term strategy of limited growth with no expansion beyond current systems. On the other hand, choosing a general-purpose RTE, like Asset, leads to a long-range strategy that can adapt to changing technology and additional vendors and can expand to include remote diagnosis and measurement, security validation and other types of testing.

In the long run, software management requires many of the tests we have named, many of the tools and techniques we have discussed and also many other aids. All the tools mentioned here become most effective when combined with good management and working procedures, such as a formal procedure for controlling software changes.

7.5 — The central staff should wait to acquire nonstandard monitors until a decision has been made on test drivers.

Monitors that report on source programs and monitors that use JAF outputs all have well-defined, standard interfaces. Other monitors, particularly software monitors, are very dissimilar and nonstandard. Many monitors are integrated with CPU drivers, and every driver that keeps a test log is also acting as a monitor.

All monitors require some data reduction and report generation operations, and software for these tasks can easily proliferate and become expensive unless the monitors are at least partially integrated.

7.6 — The central staff should develop a strong capability for using abstract testing tools.

Staff skills in the areas of analytic and simulation modeling are important. Models can qualitatively guide management decisions, such as how to address distributed processing. Models can quantitatively guide technical decisions, such as how big to make a system to get a desired throughput rate. Even simple models can yield results of great value in predicting and evaluating the performance of complex systems. In a dispersed environment, modeling offers a way to handle the problem of diversity among user sites.

There is no doubt that research in software engineering has produced substantial benefits, and bigger things are on the way. Meanwhile, instead of just sitting and waiting for the millennium to arrive, we can do a much better job with the tools we already have. Well-organized, automated benchmarking can greatly improve the quality of both new and existing software. The range of available techniques is broad enough to offer something to every shop regardless of budget.

Dr. Robert W. Shirey is a group leader at The Mitre Corp. in McLean, Va.

Since 1964 he has held positions at the University of Wisconsin's Social Systems Research Center and U.S. Army Mathematics Research Center, The Rand Corp., Computer Sciences Corp. and Booz, Allen & Hamilton.

In addition to his responsibilities at Mitre, Shirey teaches in the Management Science Department of George Washington University in Washington D.C.

Shirey holds B.S., M.S. and PH.D degrees from the University of Wisconsin at Madison and an M.B.A. from the University of Southern California.

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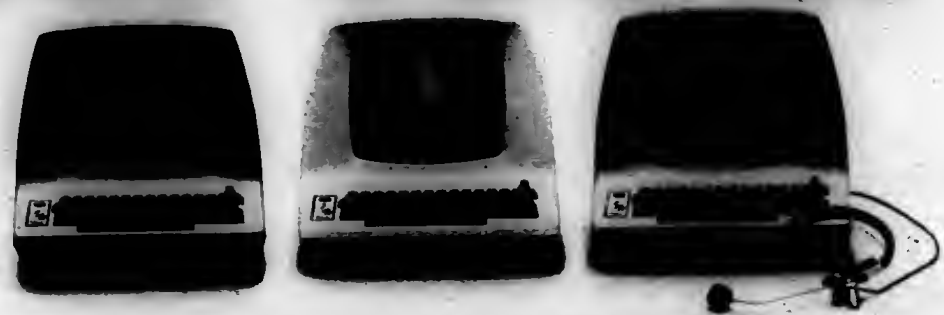

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Experts Debate the Issue

COM: Doomed, Cost-Effective or Both?

By Marguerite Zientara
CW Staff

NEW YORK — Computer output microfilm (COM) technology is in danger of becoming obsolete because people prefer working with electronic displays and word processing systems.

That was the opinion expressed recently by Kenneth Showalter, staff director of the Policy Group on Information and Computers for the U.S. House of Representatives, at the 29th annual conference of the National Micrographics Association here.

On the other hand, COM is the most cost-effective information storage method, offering a 90% cost savings over paper storage systems and taking one-eighth the CPU time needed to produce 216 duplicate microfiche vs. that needed for a 3,600-page printed report, according to H.G. Suiter Jr., manager of planning for Datagraphix, Inc.

These and other pros and cons of COM technology were presented in a session billed as "A Debate: COM vs. Other Storage and Retrieval Methods."

Suiter for the Affirmative

Claiming that COM "should remain the most cost-competitive storage method throughout the '80s," Suiter displayed a chart comparing the relative cost, storage base, access time and storage life of present and expected technologies.

Compared with such technologies as disk storage, magnetic tape, bubble memory and the coming optical video disk technology, COM is less expensive per megabyte, has the fastest access time and offers about 10 times the storage life of other media (at 100 years vs. zero to 10 years for others), according to Suiter.

H.G. Suiter Jr.

CW Photos by M. Zientara

Kenneth Showalter

And while people may prefer working with CRT terminals and word processors the cost of such devices is prohibitively high — $2,000 to $5,000 for a terminal, compared with $200 for a microfilm reader.

Furthermore, although magnetic mass storage methods, including optical disk, have larger storage bases, their access times are slower than COM's he added.

Showalter Responds

Showalter, who assesses new technologies for the House of Representatives, cited three areas he must address in each assessment: price, performance and usability.

(Continued on Page 92)

Bank Upgrades With No Complaints

GAINESVILLE, Ga. — Although it has gone through several upgrades of its equipment, Gainesville National Bank here has no complaints — "out of the ordinary."

The bank, which has assets of approximately $108 million, has been increasing its business at a rapid rate — 45% in just the last two years, according to John Huss, vice-president for DP.

That growth has led the organization to upgrade its equipment, and it moved from a Burroughs Corp. B2700 to a B2800 in 1978. That was just the latest move upward in the Burroughs line since the bank started with a B500 in 1968 and moved to the B2700 in 1975.

When the original installation was made, the firm reviewed equipment from IBM and NCR Corp. as well as Burroughs. Burroughs was chosen because the bank felt that its equipment provided "as much processing ability for the dollar spent" as the bank needed at that time, Huss said.

Current System

The current processing operation uses Burroughs' Network Definition Language software package to communicate among the B2800, 10 Model TD830 terminals and approximately 30 teller systems. Another Burroughs package, the Item Processing System, is used to handle all magnetic ink character recognition-encoded financial documents.

Huss said no complaints "out of the ordinary" have been received from his 12-person staff about the software maintenance support that Burroughs has provided through several package upgrades.

In addition to serving the bank's internal processing requirements — which include demand deposit, savings, loan accounting, accounts receivable and general ledger — payroll and accounts receivable processing services are provided to outside companies. "Presently, we do processing for some 20 companies and prepare about 700 payroll checks a week," Huss added.

The B2800 system was originally installed on a one-year lease, but in late 1979 the bank elected to purchase the system.

Datagraphix Introduces Drawer-Size Fiche Reader

SAN DIEGO — A microfiche reader designed to fit into an office desk drawer was introduced at the National Micrographics Association Conference by Datagraphix, Inc.

The reader, 4.5 in. high by 36.8 in. wide by 11.75 in. deep, is supplied with 42X or 48X magnification for 6-in. microfiche.

A dual-position lens that allows switching from one magnification to another without changing optics is available as an option.

The standard reader costs $249, and the dual-lens option increases the price to $272. Datagraphix, Inc. can be reached at P.O. Box 82449, San Diego, Calif. 92138.

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Saves $6,000 Monthly

On-Line, Tool Firm Cuts Shipping Lags 75%

By Rita Shoor
CW Staff

FITCHBURG, Mass. — By implementing an on-line order entry system, a tool manufacturing firm here has cut the time lag between receiving an order and shipping the requested materials from a former minimum of three to four days to one day on more than 80% of the orders shipped from its eight service centers.

Simonds Cutting Tools, a division of the Wallace Murray Corp., uses the system to maintain inventory control and process orders of approximately 14,000 different products.

Through savings in freight charges and clerical personnel alone, the system has already paid for itself "many times over since its installation in 1972," the company maintained.

"The network also handles all administrative traffic, price quotes and requests for delivery," Joseph L. Sylvia, manager of information systems, pointed out. This capacity enables Simonds to save the $6,000 monthly cost of its former telegraph operation.

The controlling software, called Sentry as a result of a "name-the-system" contest held within the company, was developed by the Simonds DP staff. Programs were written primarily in Cobol, and IBM's CICS was used as the teleprocessing monitor.

"It took somewhere between two and three years to bring the system on-line," Sylvia estimated.

Current hardware configuration includes an IBM 370/138 mainframe in Fitchburg linked to IBM 3774 terminals at each service center. Dual-station IBM 3742s and single-station IBM 3741s are used for data entry.

The firm's Newcomerstown, Ohio center has a remote job entry (RJE) link via a separate 3002 channel to support additional applications like its payroll processing.

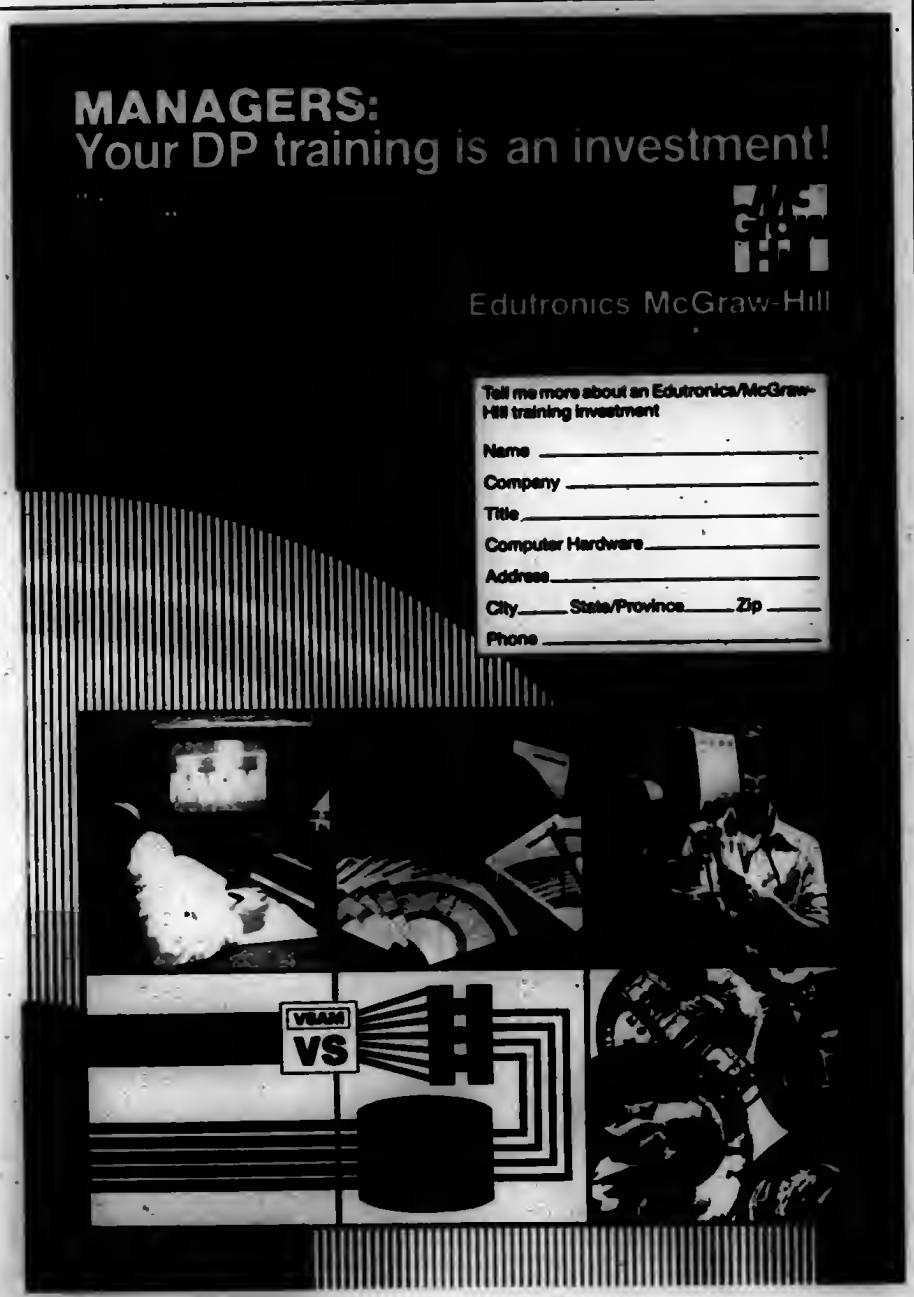
The Sentry system, in effect, allows customers to access the combined stocks of all service centers. These inventories are maintained on the DL/1 data base in Fitchburg.

Improved inventory control also allows the company to take physical inventory only once a year in order to satisfy its auditors.

As orders are keyed into the 3741/2 diskettes, they are transmitted to the central processor in suggested batches of five to ten transactions. The data base is updated, and at the originating service center a five-part form is printed specifying the items to be shipped, those back-ordered and those released to a particular plant or manufacturing facility.

Batch programs are run each evening to determine which back-ordered items have become available for shipment from each location. On the following morning, the appropriate location receives an order set that lists the back-ordered items.

In March 1980, Simonds implemented Advanced Communication Function and Virtual Telecommunications Access Method software as part of a conversion to IBM's System Network Architecture (SNA). A projected savings of $1,000/mo is seen as a result of sending both Sentry and RJE traffic on one line rather than two when the SNA conversion is complete.



COM: Doomed Or Cost-Effective

(Continued from Page 91)

Although generally acknowledging COM's price performance benefits, Showalter pointed out that while access to a disk system may be seconds slower than in a COM system, the disk system's transfer rate is "much higher."

Most important, however, according to Showalter, are the human factors involved in using the systems. "Physical manipulation of microfiche has always been abhorrent to office workers," he contended.

Microprocessors, word processors and video disk systems will be more compatible with future office automation than COM will be, he added, predicting that by the year 2,000, 98% of information access in U.S. offices will be through video displays.

"Why put data on film and then bring it back to the screen even if it costs less money?" he asked, claiming that ease of access will be the driving factor in workers' use of data retrieval systems.

"Half the microfilm readers I see still have the dust covers on them," he observed, adding that in environments that acquire terminals "right off the bat," COM readers are "just more overhead and take up extra space in the office."

COM will have to integrate with electronic display technology or become obsolete, Showalter warned, but added — on the positive side — that there is no better industry in line to take over information processing technology than the COM industry.

Again in defense of COM, Suiter recalled predictions made several years ago by forecasters — including Showalter — who then projected the demise of COM.

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Eliminates Double Keying

WP-DP Hookup Speeds Club's Mailing Task

MONTGOMERY, Ala. — When the Bass Anglers Sportsmen Society (Bass) here installed an IBM 6/450 word processing (WP) system, the ability to link the system to its NCR Corp. 8450 CPU was essential.

It took NCR approximately three months to modify the remote batch entry software so that the computer would work with the IBM protocol, according to Ray Thornton, Bass computer operations director.

The linkup between the systems allows Bass to generate personalized letters to customers without a double-keying effort and freed up three clerical people in the WP area for other duties.

Bass, with approximately $15 million in annual sales and more than 325,000 active international members, relies heavily on direct-mail marketing techniques for its profits.

Start of the Process

When a new member signs on, his name and address is entered through NCR 501 terminals and stored on NCR 658 disk packs.

The data is then transferred to the WP system's floppy disk and personalized form letters to welcome new members are generated and combined with membership cards and invoices printed by the computer system. "We were able to eliminate nine automatic typewriters from the WP setup when the systems were tied together," Thornton recalled.

An example of how the system works in the opposite direction (WP to computer) is illustrated by the company's method for processing responses to campaigns in which current Bass members are promised premiums for recruiting new members. Prospect names are sent to word processing, and personalized membership invitation letters are created for immediate mailings.

The information is then transferred from the WP system to the NCR system, where the addresses are sorted by Zip Code so the letters can be sent out at the less expensive bulk mail rate. Finally, the pertinent prospect data is stored on disk for future mailing.

Environment's Evolution

Bass installed its first computer system, a 32K-byte NCR 101 in early 1974. The organization has gone through several upgrades to reach its present configuration with an NCR V/8455 mainframe operating under Virtual Resources Executive (VRX) software. Six 2M-byte NCR/658 disk drives, one tape drive and seven on-line CRTs are included in the hardware environment.

Another direct-mail application is controlled by a source analysis program developed as part of an integrated marketing-oriented package. "Every direct-mail document carries a unique printed code," Thornton said, "and brackets within this five-character code identify the mailing and tell us which premium items are promised.

"When a prospect returns a document; a data entry clerk keys in this source code and a computer program notes the source for each new member in our membership file," he continued. "Simultaneously, percentage returns are calculated, as are profit and return on investment."

Thornton estimated that even at peak times when Bass is processing up to 10,000 responses a day, a fulfillment schedule with turnaround of one week or less is maintained.

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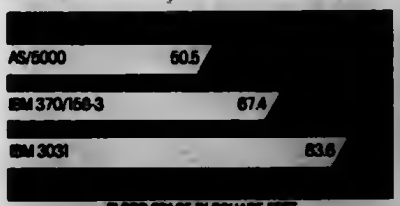

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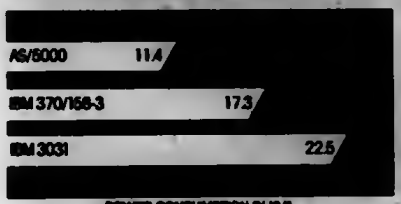

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No. of Circuits/Chip	704 (Maximum)	6 (Maximum)
No. of Circuits	4000 (Typical)	4000
No. of Interconnections (Chip-to-Substrate, Module-to Card)	1081	21,440
Wiring for Comparable Function	5 Meters	300 Meters

Comparison of MCM Packaging

IBM Engineer Describes MLC/MCM Chips in 4300

SAN FRANCISCO — The key features of the multilayer ceramic, multichip modules (MLC/MCM) used in IBM's 4300 series of processors were described at the recent Electronic Components Conference here.

The design, tooling and fabrication techniques used to produce the MCMs were reviewed by Dr. Albert J. Blodgett Jr., an IBM engineer.

In the traditional one-chip-per-module circuit package, the package serves as a simple space expander (see box at left comparing MLC/MCM package with earlier 370 packaging concepts). With 17 or 23 layers of interconnective wiring contained within the substrate, however, the MCMs provide the means to interconnect chips, a function formerly performed at the card level.

Two types of substrates, 35mm and 90mm square, each serve as carriers for up to nine large-scale integrated (LSI) circuit chips with a theoretical maximum of 6,300 logic circuits or a mix of logic and array chips.

In a typical MLC substrate, the layers are arranged as follows:

- *Redistribution layers:* The top six layers redistribute the signal lines from the .25-mm chip pad grid first to the top surface and then to the .5-mm internal wiring grid.
- *X-Y wiring planes:* The middle layers contain the wiring that formerly appeared on cards and which now provides the personalization required to interconnect the chips on top of the substrate.
- *Power distribution layers:* The bottom five layers distribute power from the pin grid to other substrate layers and redistribute signal information from the personalization layers to the next level of packaging to which the module connects.

Higher speeds and less power consumption resulting from reduction of overall wire length, lower costs at the card and board levels and increased reliability from the reduction of interconnections among packaging levels were among the advantages obtained by taking the MCM design approach, Blodgett said.

Adapter Links Magnuson M80s

SAN JOSE, Calif. — Magnuson Computer Systems has introduced a channel-to-channel adapter designed to simplify communications between its M80 processors or between M80 CPUs and other systems.

The stand-alone adapter allows a Magnuson installation to support interprocessor communications at the block multiplexer level, which is "more direct" than conventional data communication lines, according to the company.

Three subchannels allowing up to six processors to be linked can be supported in one adapter cabinet. Although Magnuson expects three subchannels to be the maximum in each cabinet, the company maintained that "more could be included without straining the capacity of the adapter."

The adapter can operate at a data transfer rate of 2M byte/sec, which Magnuson claimed exceeds IBM's normal maximum rate of 1.5M byte/sec. The result is that the slowest processor in the system, rather than the channel-to-channel adapter, will control the actual transfer rate.

Available immediately, the Magnuson units are hardware- and software-compatible with IBM channel-to-channel adapters. The basic adapter, including the first subchannel line, is priced at $12,500; additional lines are $10,000 each.

Magnuson is at 2902 Orchard Park Way, San Jose, Calif. 95134.

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Wilson Jones has a system that provides more printout storage space per dollar. It's modular. It's work-efficient. It's the DataCenter.

It's available in several sizes. The big DataCenter occupies 6 sq. ft. and holds 37,000 printout sheets 14⅞" x 11" or smaller, in 36 or more nylon post binders. There's also a unit that fits in only 4½ sq. ft. and holds 24,600 printouts in 24 or more binders. Horizontal or vertical add-ons store 12,000 more printouts.

And there's a special DataCenter designed to hold up to 37,000 letter-size sheets in either printout binders or ring binders. Perfect for reports generated by high-speed printers. DataCenter modules come with the channels and T-bars you need to suspend binders.

Want to turn wasted space into work space? Use DataCenter modules as dividers between departments or work stations. Modules blend with office decor, thanks to an attractive contemporary black finish and woodgrain worktop. Easy binder removal from front, back or side makes them convenient. And their tubular steel frames make them rugged.

Wilson Jones is an innovator of the modern way to handle, store and retrieve computer printout. First we invented nylon post binders. Then the first real printout binder retrieval system. Over the past 20 years, we've introduced 900 printout storage and retrieval products, all work-efficient. All cost-efficient.

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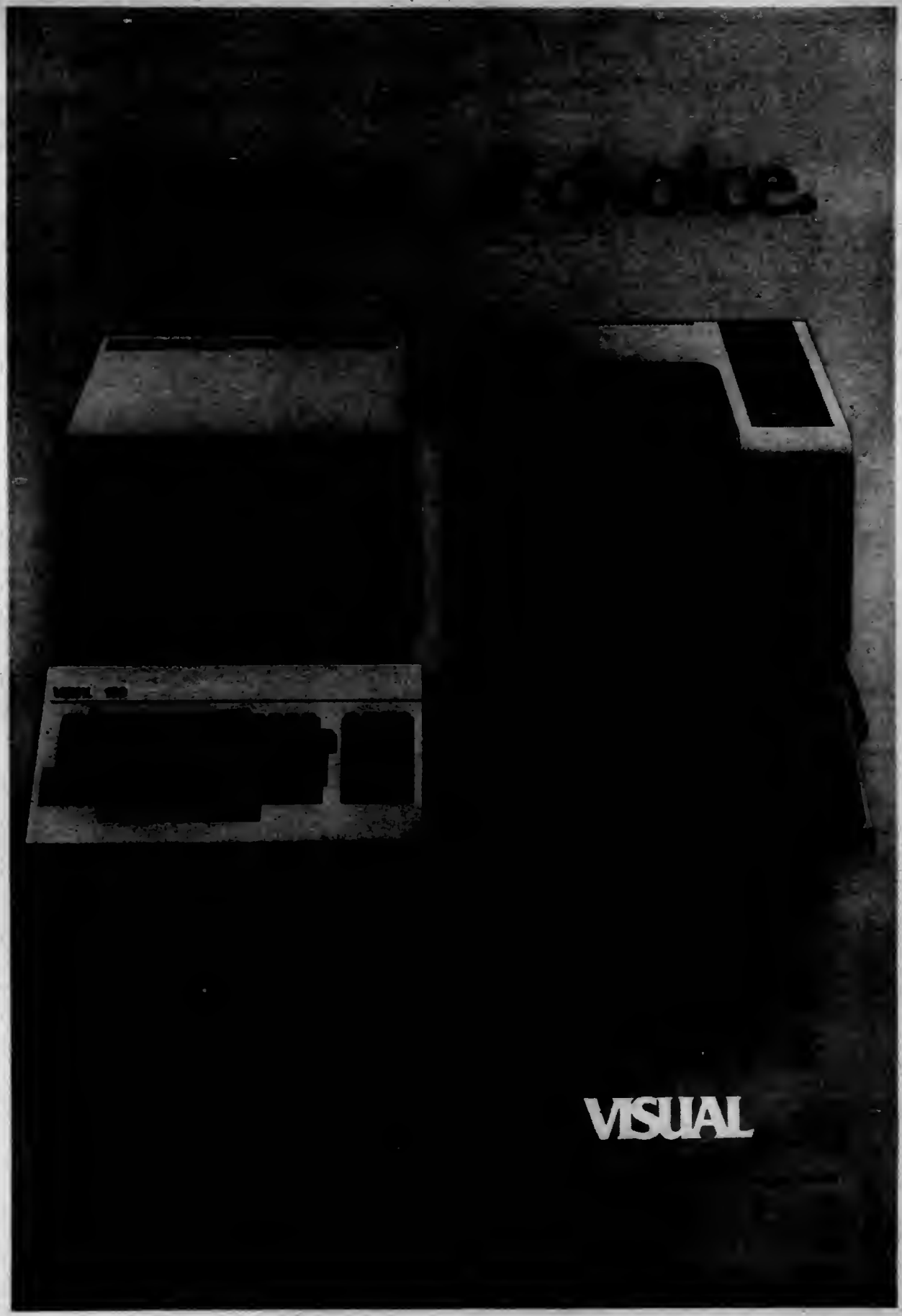
VISUAL

Peripheral Runs as Printer Or Multicolor Plotter

IRVINE, Calif. — A peripheral which operates as both a standard black-and-white line printer and a multicolor plotting device was announced by Trilog, Inc.

In print mode, the C-144 operates at 190 line/min with a 96 upper/lower case character set. In multicolor mode, hard copies are made with Trilog's tricolor ribbon and bidirectional paper drive system. Eight colors on the screen can be reproduced by various combinations of the three ribbon colors, Trilog said.

"The Colorplot C-144 is the only peripheral on the market that can do double duty as both a standard black-and-white line printer and multicolor hard-copy plotting device," Trilog claimed. "And no operator intervention is required to make a copy."

Resolution of 100 dot/in. horizontally and 144 dot/in. vertically is specified for the C-144 and the printed copy of the screen image is 10 in. wide by 7.5 in. high.

The printer/plotter allows for "a cost per copy which is one-tenth that of photographic techniques," according to a company spokesman, and the unit is priced at $10,700 in single-unit quantities, including 90 days of service.

Delivery time of 45 days is quoted by Trilog, Inc., 17391 Murphy Ave., Irvine, Calif. 92714.

Free Brochures Describe Varied Products, Services

Several vendors are offering free brochures.

A brochure on the ability of automatic humidifiers to alleviate DP equipment problems caused by static electricity is being offered by Research Products Corp. The "Humidification Survey Sheet" (Form 1774) is available from Research Products Corp., P.O. Box 1467, Madison, Wis. 53701.

Product literature on the TDX Series II 75 in./sec tape drive and its embedded formatter is available from TDX Peripherals. The company is located at 150 New York Ave., Halesite, N.Y. 11743.

Honeywell, Inc. has published a 20-page brochure with data on the components, capabilities and characteristics of its Page Processing System (PPS II). Publication CJ98 is available at 200 Smith St., Waltham, Mass. 02154.

National Advanced Systems is offering brochures describing its families of IBM-compatible processors. The literature discusses the performance characteristics of the AS/3000, AS/5000 and AS/7000 processors and is available from National Advanced Systems, 3145 Porter Drive, Palo Alto, Calif. 94304.

A booklet describing the goals, structure and services of the International Micrographic Congress is available from International Micrographic Congress, P.O. Box 22440, San Diego, Calif. 92122.

A reference guide for comparing the relative computer power of mainframe systems from five vendors is available from NCR Corp. The guide lists Honeywell, IBM, Univac, Burroughs and NCR systems on an ascending power scale. It can be obtained by writing to NCR, P.O. Box 606, Dayton, Ohio 45401.

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Printers Run With DEC, IBM Systems

STAMFORD, Conn. — Printer systems that are compatible with the Digital Equipment Corp. Decsystem-20 and IBM's System/3 and Series/1 have been introduced by Digital Associates Corp.

Eight printer configurations offer speeds of 300 line/min to 1,200 line/min and include drum, chain train and Charaband models. All standard character sets and fonts are available, according to a company spokesman.

Prices range from $15,000 for a 300 line/min printer system to $36,500 for a 1,200 line/min Charaband printer.

Digital Associates Corp. is located at 1039 E. Main St., Stamford, Conn. 06902.

Security System Aids Small User

CHATSWORTH, Calif. — A programmable security system with the capacity to handle up to 1,000 access cards has been introduced by Cardkey Systems here.

The Programmable Voiding Reader System (PVR) is said to provide the advantages of security to smaller manufacturers, offices and businesses as well as DP centers. The PVR system can be used "to void any card key . . . in seconds," according to the company.

The system's access reader contains a void card relay which can be connected to an external alarm system. This results in access being denied and an alarm being activated if a voided card is used.

Priced at about $3,400, the PVR system is available from Cardkey Systems, 20660 Bahama St., Chatsworth, Calif. 91311.

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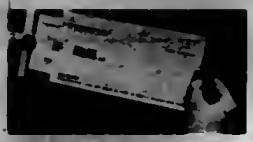

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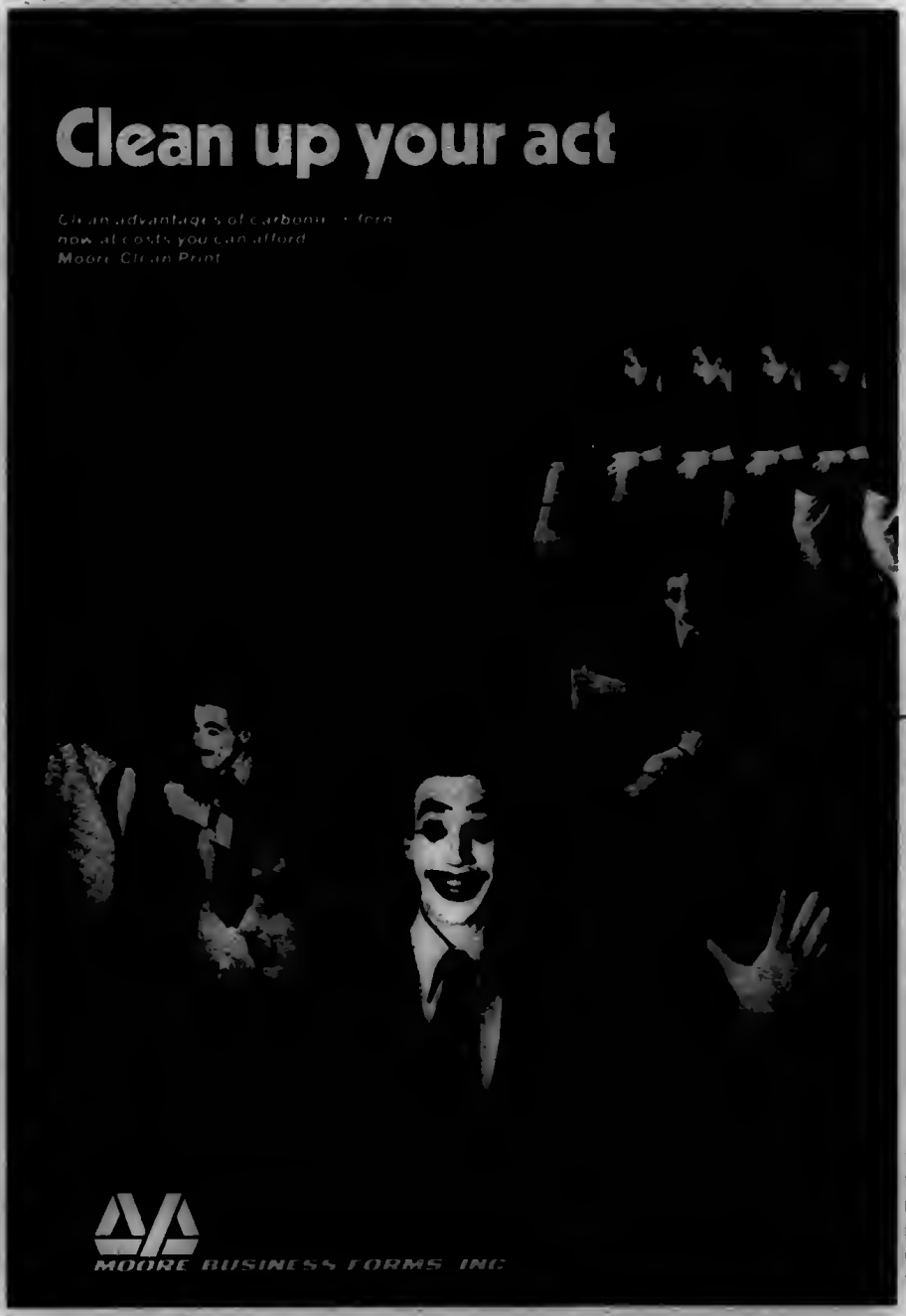

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CWS-80

For Storage, Distribution

WP-COM Combination Seen Dynamic Duo

By Marguerite Zientara
CW Staff

NEW YORK — For archival storage of documents and mass distribution of documents on fiche, the ideal solution is integrating word processing (WP) and computer output microfilm (COM) equipment, according to Brian Follett, marketing coordinator for the Business Communication Products Department at 3M Co. in St. Paul.

Despite the fact that WP and COM people generally know very little or nothing about each other's technologies, he claimed the two are a perfect combination for such applications.

Speaking at the recent National Micrographics Association conference in New York, Follett explained the beauty of such a merger. "From the user's standpoint, the program is exceedingly simple. A tape drive is connected to our word processor, although that is still a fairly expensive proposition," he said, noting that 3M's cheapest model of tape drive costs $9,000.

"Then a diskette is loaded into the machine, a group of documents is selected from the index or directory and a tape is written in print image format."

Feature Trade-Offs

The system eliminates the need for photographing each piece of paper for filming and instead captures the original keystrokes on the WP media for transfer to the COM device in machine-readable format. But, Follett noted, certain WP features are sacrificed in the process.

The features that are lost are the ability to insert graphic material into the text, such as diagrams or pictures; underlining; subscripts and superscripts; double- and triple-line spacing; and lines longer than 132 characters.

Also traded off are different pitches (char./in.), because the COM unit outputs only single-density monospace text; flush-right margins; and highlighting or bold print.

"Many of these lost goodies may never be possible on COM equipment, being more appropriate to phototypesetters. Others are just a function of software and may appear in a later version.

"For now, though, no one is complaining — because very few people are using the software," he said.

Product Evolution

In describing the evolution of the WP and COM system interface, which has been available to 3M users since the beginning of the year, Follett recalled 3M's acquisition in 1975 of Linolex Systems, maker of WP equipment.

"Long before the acquisition," Linolex offered a range of half-inch standard magnetic tape drives as peripheral devices for its programmable terminal.

"It was inevitable that a WP customer in the government would discover that the Government Printing Office accepted magnetic tape as input to its giant phototypesetting system and request that Linolex write a program to transfer documents from WP cassettes to nine-track tape.

Long after the acquisition of Linolex by 3M, diskettes became the standard media on the word processor. The interface software was also rewritten and improved, and devices became available that allowed the word processor to transmit text to the phototypesetter via communications.

Because the cost of a communications option on the word processor and a receiving device connected to the phototypesetter was far less than the cost of two tape drives, the number of installations increased dramatically, Follett added.

"Not only was the communications option an order of magnitude cheaper than the tape drive, but it was also more familiar to the WP user and therefore more acceptable.

"This, and the expanding use of flexible diskettes on both word processors and phototypesetters, has brought the two types of equipment much closer together in recent years," he continued.

For even more expanded use of such systems, however, some changes will have to be made. "The burden is on the COM manufacturers to incorporate communications ports into their devices, to allow a broader range of inputs — not just from word processors, but even from minicomputers without a tape drive," Follett concluded.

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Unit Embosses Plastic Cards

RANDOLPH, Mass. — A computer-controlled plastic card-embossing system designed for industries requiring the "immediate" issue of a card has been announced by Dymo Business Systems, Inc.

The Cardwriter III costs from $9,995 with a standard RS-232 EIA interface to $14,495. An optional Terminal One CRT backup unit is available for $2,500.

Dymo Business Systems, Inc. is located at Randolph Industrial Park, Randolph, Mass. 02368.

'Industry's Most Powerful'

Apple III Fits Small Business, WP Use

CUPERTINO, Calif. — Apple Computer, Inc. expanded its product tree today by introducing an integrated personal computer system geared for small business and word processing (WP) applications.

Billed by the company as the industry's most powerful personal computer, the Apple III has up to 128K bytes of random-access memory (RAM) and a built-in disk controller that can handle up to four floppy disk drives. The new entry features an MPU based on a superset of the standard 6502 instruction set, a relocatable base page register, a relocatable stack and an integrated 6-bit digital-to-analog converter for voice or music generation.

The Apple III system is currently available in two versions, each structured around recently unveiled software packages. The first system, the Information Analyst, was designed to be used as a tool for business planning, forecasting, modeling, pricing and costing, scheduling and budgeting, an Apple spokesman said.

The Information Analyst consists of an Apple III with 96K bytes of RAM, a built-in 5.25-in. floppy disk drive and a redesigned keyboard. The new keyboard features sculptured key caps that reduce glare and a 130-key numeric pad. In addition, two of the keyboard's keys permit "soft" or program-defined functions, so commands can be executed with a single keystroke, the spokesman stated. All keys have a hold-down, auto-repeat function.

Apple's business-oriented package also includes a Silentype thermal printer or letter-quality printer and a 12-in. CRT monitor. In addition, the system has card slots for optional I/O and can be hooked up to a color monitor for color graphics activities.

Software includes the firm's Sophisticated Operating System (SOS), Visicalc III, Mail List Manager and Apple Business Basic.

Word Processor

The Word Processor system is similar to the business version, but has a second floppy disk drive and the word processing software in place of the business programs, the spokesman noted. The second disk drive is external and has the ability to store 60 pages of text per floppy diskette.

Options for the two system packages include up to 32K bytes of additional RAM, additional disk drives, I/O cards for linking the systems to a variety of peripheral devices and a vinyl carrying case.

Finally, the Apple III system has a heavy-duty switching power supply that permits the computer to handle more peripherals than the firm's systems I and II. The system's power supply has a "hidden" reset key to prevent accidental resetting and was designed to comply with Federal Communications Commission standards on radiated interference, the spokesman pointed out.

The Apple III Information Analyst costs $4,000, and shipments are scheduled to begin in July. The Word Processor system sells for $5,400 with the thermal printer and $7,800 with a daisy-wheel printer. It is slated for shipment sometime in September, the spokesman said from the company at 10260 Bandley Drive, Cupertino, Calif. 95014.

Qantel Unwraps Mini Series For Multiuser, Multitask Use

HAYWARD, Calif. — Qantel Corp. has unwrapped a series of minicomputer systems that support multiuser, multitask operations with up to 16 tasks and can handle up to 64 terminals.

The first system in the eight-system family is the 220, which is a stand-alone computer with 65K char. of main memory, a detachable Model 4031 CRT terminal, the firm's Model 3111 fixed- and removable-disk storage unit that has a total capacity of 12M char., and a 150 char./sec serial matrix line printer.

While the 220, in its basic state, is suited for most small business applications, the system can be expanded to handle larger chores. For instance, the main memory can be boosted up to 256K char. in 32-char. increments and the system can support up to 32 CRT terminals, depending on the user's applications. In addition, the system can carry up to four 12M-char. disk drives or any other disk drive in the firm's line, be attached to the 5215 or 5205 magnetic tape units or handle higher speed printers, a spokesman said.

The system 320 is similar to the 220 but, in its standard configurations, has 131K char. of main memory, expandable to 1,024K char. The system comes with two CRT terminals, with the potential to support 64. It has one 12M-char. disk storage unit, but can carry six in its full capacity. A 300 line/min printer is also standard with the 320 machine, the spokesman noted.

The next hardware stepup in the series is the System 230 and 330.

Two-Model 230

The 230, which consists of two models — the 231 and 232 — differs from the previous two computers in that it incorporates a Winchester-type sealed disk storage unit. The 231 has a fixed-disk capacity of 10M char. and the 232 has a drive boasting 40M char. Both models include a large-reel 45 in./sec magnetic tape drive as standard equipment and a 150 char./sec printer.

The 230's memory can be expanded from 65K to 256K char. and can support up to 32 terminal users. For more storage capacity the 231's Winchester disk drive system can be expanded to 20M char. In addition, both the 231 and 232 can support up to six 10M-, 20M- or 40M-char. disk drives, the spokesman continued.

Like the relationship shared by the first two computers, the 330 is based closely on the 230, but has the potential for more expansion. Standard 330 features include 131K char. of main memory, two CRT terminals, the 45 in./sec tape drive and the 300 line/min printer. The 330 is also split into two models, the 331 and 332, supporting 20M and 40M char. of Winchester disk storage, respectively.

(Continued on Page 106)

HP Boosts Disk Drive, Memory, Operating System for HP 250

PALO ALTO, Calif. — Hewlett-Packard Co. has boosted the capabilities of its HP 250 minicomputer by adding a variety of options ranging from a Winchester disk drive to less expensive add-on memory.

The 12.1M-byte Winchester disk drive replaces the firm's previous options for dual- and triple-flexible disks and is said to offer four times the data capacity of the former products. The disk's average seek time is 70 msec, with a maximum transfer rate of 526.7K byte/sec. The system fits into the HP 250's console and includes a 1.2M-byte flexible diskette for backup and data loading, a spokesman stated.

The Winchester disk option is priced at $23,000 and first shipments begin this month.

Add-On Memory

Because of HP's recently unveiled 128K-byte memory boards, the company's add-on memory for the 250 costs 34% less than previous similar offerings. The add-on also increases the maximum memory available to the user to 384K bytes in systems carrying a maximum of six terminals.

To obtain a full multiuser performance level, the 250 user allocates memory in 32K- or 64K-byte partitions to each terminal on the system. Since no disk swapping or memory management schemes are needed, the system must be equipped with at least 32K bytes of memory for each terminal and each may have a maximum of 64K bytes, the spokesman explained.

The add-on memory costs $19,530 per 1M byte as opposed to the old price of $29,690 per 1M byte.

Finally, HP recently unveiled a revision of the 250 operating system that allows the computers to read and write IBM 3741-formatted diskettes. In this format, flexible disks are recorded single-density on one side only, with a total capacity of 256K byte/disk.

Additional information on the disk drive, memory and operating system can be obtained from HP at 1501 Page Mill Road, Palo Alto, Calif. 94304.

'Micro-Winchester' Stores 6.3M Bytes

SCOTTS VALLEY, Calif. — Shugart Technology has introduced a 5.25-in. Winchester disk drive that is said to store 30 times as much data and transfer it 20 times faster than a standard minifloppy disk drive.

Billed by the company as the first micro-Winchester, the ST506 uses standard Winchester head technology to store more than 6.3M bytes of unformatted data. The unit records information at approximately 7,500 bit/in. This is reportedly a 10% higher density than a double-sided 8-in. floppy, but 15% less than the highest capacity 8-in. Winchester device.

The unit's stepper motor utilizes a steel band to position the heads over 153 tracks. Track-to-track access time is 3 msec with a 15-msec settling time on the last step, a spokesman said. This provides an average access time of 170 msec.

The ST506 costs $1,500 in single units, but is primarily aimed at the OEM market. Additional information is available from the firm at 340 El Pueblo Road, Scotts Valley, Calif. 95066.

Alternative to VAX, 3240, MV/8000

SEL Adds New Cap to Its Line of 32-Bit Minis

FORT LAUDERDALE, Fla. — Systems Engineering Laboratories, Inc. (SEL) has introduced a top-of-the-line 32-bit minicomputer system that it said offers up to 80% greater performance in a multitasking environment than the firm's previous lead entry.

The Model 32/7780 replaces the 32/77 as king of SEL's computer hill and is available in one packaged and three OEM configurations. All of the versions were designed to compete with Digital Equipment Corp.'s VAX-11/780, Perkin-Elmer Corp.'s 3240 and Data General Corp.'s newly arrived MV/8000 systems.

The packaged 32/7780 contains a CPU with either 1M or 2M bytes of memory and an internal processing unit, which functions like the CPU but does not execute I/O instructions. In previous SEL systems, the internal processing unit was offered as an add-on feature, so the 32/7780 marks the first time the unit is available as standard equipment, a spokesman noted.

Other features of the end-user 32/7780 include a disk processor with an 80M-byte disk drive; a tape processor and a 45 in./sec tape drive; a controller for handling a Teletype Corp. machine, line printer or card reader; a CRT terminal; and the firm's MPX operating system.

The system also has a real-time option module; a real-time clock; an interval timer; a control timer; and two high-speed floating point units and scientific accelerators, one each for the CPU and internal processing unit.

Other options include a 75 in./sec tape drive for $3,500, a writable control store scientific accelerator for $4,000 and a 300M-byte disk drive for $10,000.

The three OEM versions of the 32/7780 range from a basic system containing just the CPU, internal processing unit, 1M byte of memory and real-time option module to a high-end system that adds the floating-point units and scientific accelerators. System prices range from $84,000 to $102,000.

An extra 1M byte of memory for the OEM versions sells for $23,000, SEL said from 6901 W. Sunrise Blvd., Fort Lauderdale, Fla. 33313.

DEC Users Get Tape Unit

NATICK, Mass. — An RS-232C-compatible dual-drive cartridge tape system that provides Digital Equipment Corp. minicomputers and microcomputers with up to 500K bytes of on-line storage is being offered by Control Logic, Inc.

The Micro-Tape system features an RS-232C interface and is said to minimize access times by utilizing random-access block addressing that permits erasing and rewriting adjacent information blocks. The system has transmission speeds from 110- to 38.4K bit/sec and uses 3M Co. DC100A cartridges.

Designed to work in harsh environments, Micro-Tape is equipped with a power line filter to eliminate transients and noise. It operates at temperatures to 113°F.

With 20W power supply, the tape system costs $2,250 from the company at Nine Tech Circle, Natick, Mass. 01760.

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• 300, 600, 900 lpm printers	☑	☐
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Service Repairs Floppy Drives

BELMONT, Calif. — A repair service for Shugart Associates, Inc. and Pertec Computer Corp. 8-in. and Shugart 5.25-in. floppy disk drives is available from Trans Datacorp.

The firm uses computer test equipment that is said to perform up to 70 diagnostic checks. The test format is tailored toward IBM compatibility and other special recording applications, a spokesman stated.

Trans Datacorp also refurbishes IBM 2314 and 3330 and Control Data Corp.-type storage module disk drives, he noted from 1717 Old County Road, Belmont, Calif. 94002.

Apple II Users Gain Color Graphics System

NORTHRIDGE, Calif. — A graphics tablet and drawing system that creates high-resolution color graphics on Apple Computer, Inc. Apple II microcomputers is available from Rainbow Computing, Inc.

Called Versawriter II, the system includes a digitizer and software package that can be used to trace maps, design schematics or transform any 8.5- by 11-in. picture into a color display.

Versawriter II plugs into the Apple's I/O port. Its drawing arm traces lines, graphics or pictures for display on a monitor screen. Any drawing can be saved on disk, Rainbow said.

For use with any Apple II with Applesoft read-only memory and 32K bytes, the Versawriter II costs $249.95 from Rainbow Computing, 9719 Reseda Blvd., Northridge, Calif. 91324.

Now: A Disk Subsystem that will help your computer fulfill its potential.

If you suspect your CPU isn't delivering all the throughput it promises, here's the solution: STC's 8000 Series Disk Subsystem. It's a family of disk drives and controllers that goes beyond mere compatibility to provide innovative hardware features and performance enhancements. Coupled with STC's uncompromising support, the 8000 Series will enable your IBM or compatible system to process more information, faster. And, it significantly lower cost of ownership.

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The 8000 Series is absolutely software compatible with IBM's 3880, but that's where the similarities end. You have a choice of string switch, dual port, or both — on the more adaptable. You get multiprocessor attaching, 64-volume support and 8-string addressing for configuration flexibility and increased availability. And you get a choice of the proven STC 8650 with 3177.5 kbytes per spindle and the double-density STC 8650 with 4886 kbytes per spindle. In short, it's the most powerful disk subsystem ever offered for mainframe computers.

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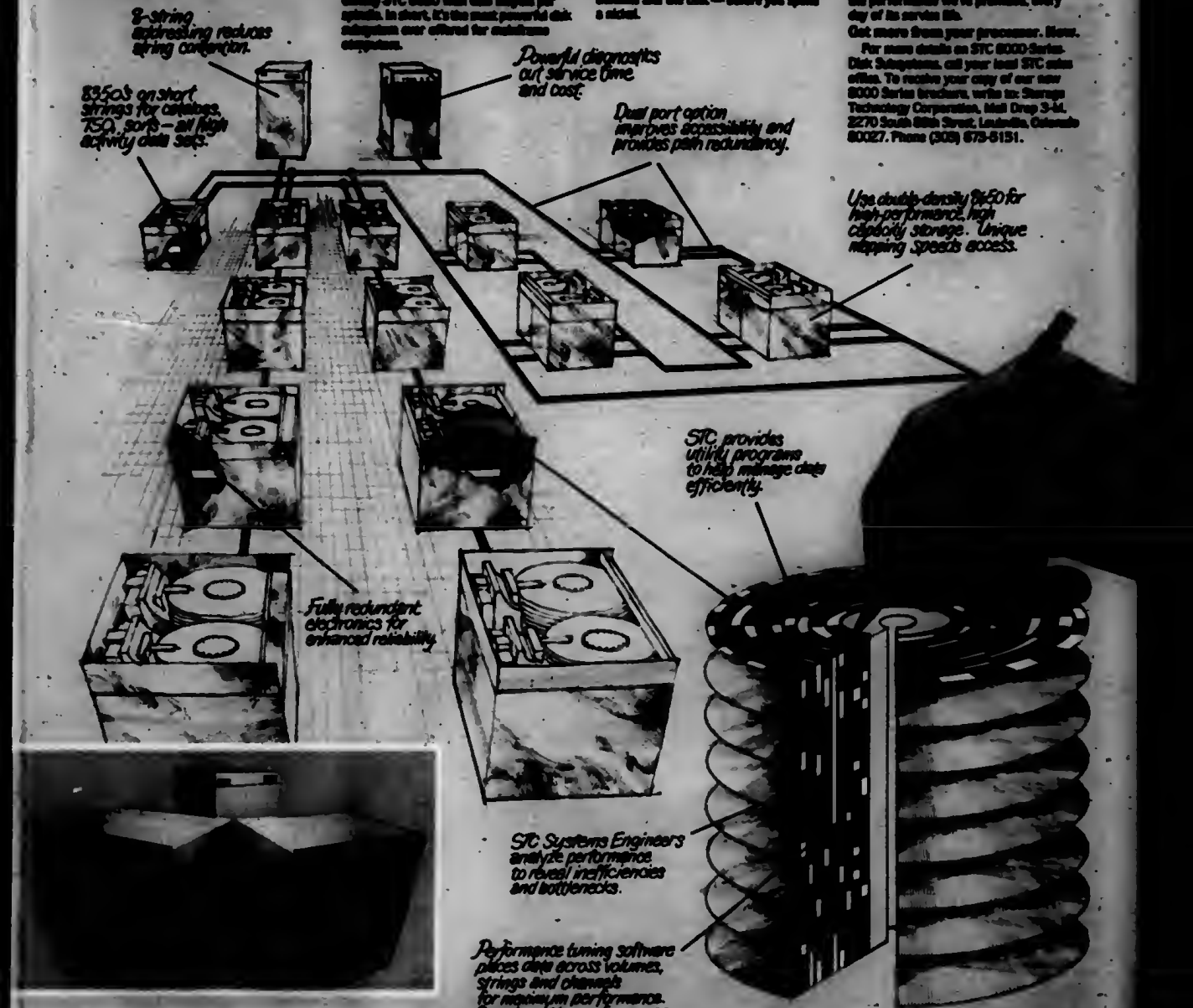

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Fulfilling the promise of technology

Qantel Offers Minis For Multiuser Tasks

(Continued on Page 103)

The system 240 is similar to the previous systems, but offers higher Winchester disk storage capacities. The Model 245's disk system has a capacity for 70M char., while the 246 drive accommodates 140M char.

Model 340

The 340 system is similar to the 240 models except that it can be expanded to a greater degree to fit more diverse applications.

The unit has 131K char. of main memory, two CRT terminals and either a 70M-char. Winchester with the 345 model or a 140M-char. drive with the 346.

Like previously mentioned systems, the 340 versions can be linked with up to six disk drives in any capacity configuration, the spokesman pointed out.

Top of the Line

Finally, the firm unveiled its two top-of-the-line systems that are totally geared for multiuser, real-time environments.

The 250 system encompasses three models — the 251, 252 and 253 — that differ solely in the amount of storage capacity each one supports.

All three systems are reportedly built for businesses that require high volumes of data and can function as a satellite arm or network center in a decentralized processing system.

The systems have a standard 98K char. of main memory, a CRT terminal, magnetic tape drive and 150 char./sec printer.

However, the 251 comes with a 40M-char. Winchester disk unit, the 252 has a 90M-char. device and the 253 has a 200M-char. disk system, the spokesman said.

All of the 250 computers can be expanded to 256K char. of main memory, be fitted with a variety of printers and support up to six Winchester disk drives.

Three-Model 350

Lastly, the 350 system is similar to the 250 but comes with 131K char. of main memory. Broken down into three separate models — the 351, 352, and 353 — the system offers 40M, 90M and 200M char. of Winchester disk storage, respectively.

All of the Qantel systems are available for immediate delivery.

In fact, nine System 231s were recently ordered by the Royal Tallow and Soap Co. of San Francisco. The first 231 was just installed in the firm's San Diego office and the other eight will be scattered throughout its regional branches starting later this month.

Because of the series' modularity, prices for the computers range from $20,000 to $200,000, depending upon the configuration, the firm stated.

Qantel Corp. is located at 3525 Breakwater Ave., Hayward, Calif. 94545.

Compas Adds Single-Board Module

AMES, Iowa — Compas Microsystems, a division of Computer Applications Corp., has announced an addition to its single-board computer module line that features a 6500 series processor and is geared for the Rockwell System 65 bus standard.

The Compas Single Board (CSB) 2 includes a Motorola Corp. 6502 processor, 2K bytes of static random-access memory (RAM) and four sockets for mounting Intel Corp. 2716, 2732 or 2764 erasable programmable read-only memory (Eprom) chips.

Thirty I/O Lines

The unit provides 30 I/O lines, 10 buffered output lines, two interval timers, a serial-to-parallel and parallel-to-serial shift register and an input latching feature on peripheral ports, a spokesman stated.

The CSB 2 has software-selectable I/O speed ranges from 110- to 19,200 bit/sec and up to 32K bytes of Eprom space. All Eprom and RAM addresses are switch-selectable, the spokesman added.

The stand-alone module costs $395 in single quantities, but the unit can be bought singly for the 100 quantity or more price of $250 if the user prepays or has the device shipped COD, the firm said.

Compas is located at 224 S.E. 16 St., Ames, Iowa 50010.

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Mini Brews Eye-Opening Reports for Coors

Special to CW

GOLDEN, Colo. — If you think someone has been sipping at your beer, you may be right. And it could even have been a minicomputer.

Actually, desktop computers are being used by one of the country's leading breweries to perform statistical analyses and other calculations using various test data. The computers then generate management reports complete with graphs and charts.

The 11 different management reports cover the total production process at the Adolph Coors Co. here. Information includes brewing materials and processes, malting, taste and yeast tests, fermentation and storage, finishing, container quality, weight sampling, packaging process and turbidity.

Test results from all these areas are entered on a daily basis into a Hewlett-Packard Co. Series 9800 System 45 desktop computer.

Previous System

Before Coors selected the HP desktop computer system, a time-sharing system was used to handle the work load. However, generating helpful charts and graphs via time-sharing became prohibitively expensive and, therefore, was done manually — a very time-consuming process.

Much of the data previously gathered by hand is now collected through direct interface with various measuring devices.

Work previously performed by three employees is now handled by two employees who have been able to take on additional reports and programming as well. Also, the desktop computer can print long management reports more quickly than the much slower time-sharing terminals.

Analysis of the spring water used in Coors beer is a good example of the daily testing process. Water samples are analyzed at springs in the valley behind the brewery, at the water treatment plant and at about a half-dozen places within the brewery.

These test results — on such variables as chemical analyses, biological quality, temperature and physical parameters — go into the desktop computer to be included in a 25-page brewing materials report.

In another testing situation, desktop computers perform statistical analysis and reporting of data related to cans, bottles and paper packages, as well as to chemicals needed to manufacture these containers.

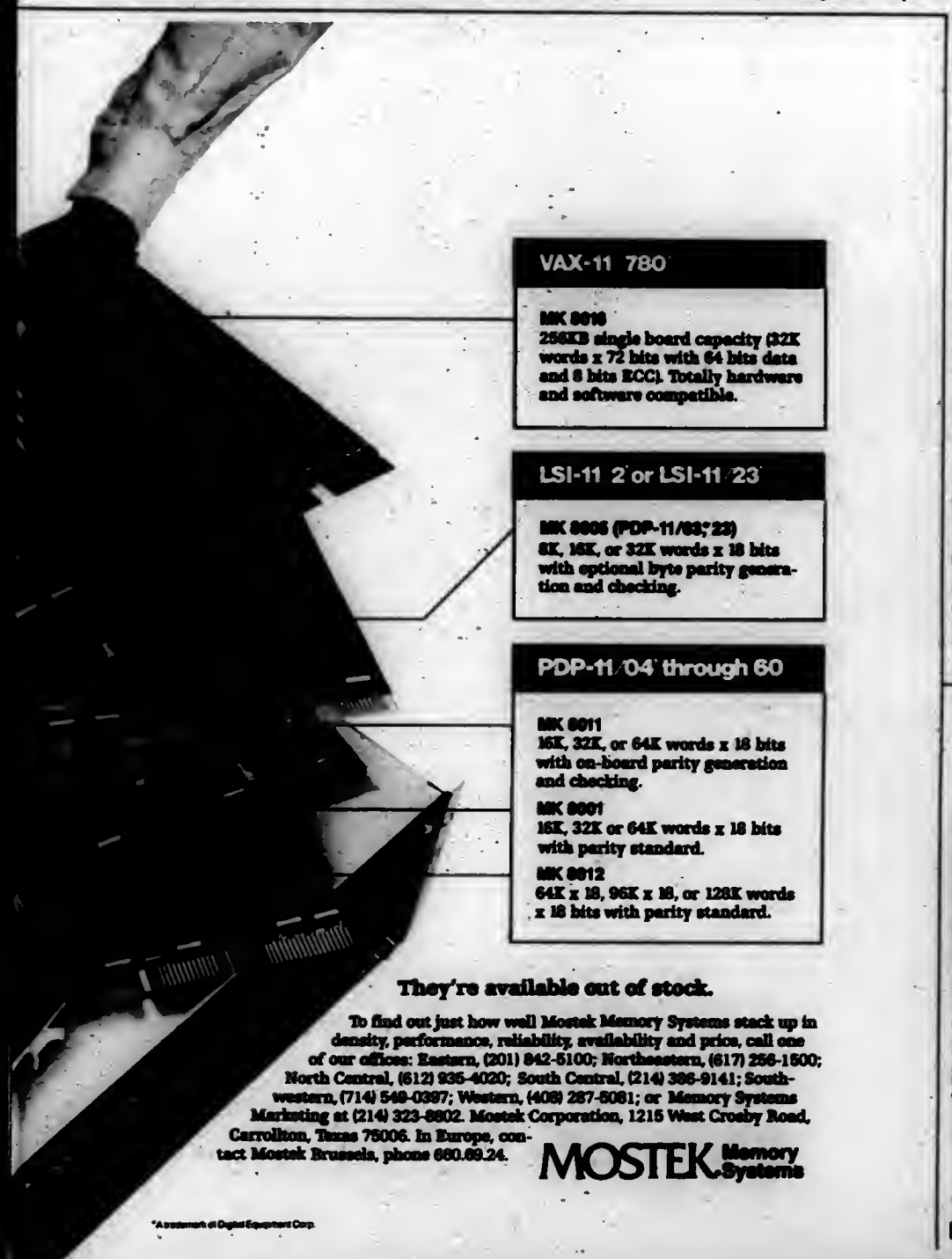
Other Applications

Outside of the many testing applications, employees at Coors use desktop computers in other functions as well.

The research and development department has used them for projects involving both brewing and packaging methods.

The lab is also developing applications for its HP desktop computers that will control inventories of equipment, supplies and chemicals.

Because of the earlier-than-expected payback on their HP system, Coors management is planning to purchase additional mass storage and to upgrade the company's System 45. The system presently has a standard CPU with 56K bytes of user memory, a keyboard, a CRT terminal and an integral cartridge tape drive with a 217K-byte storage capacity.



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Exxon in the DP Market: Why?

By Brad Schultz
CW Staff

The integration-oriented supercontroller just announced by Intecom, Inc. of Dallas [CW, May 12] may spearhead Exxon Corp.'s entry into the DP/telecommunications marketplace, according to some industry observers.

Why would Exxon Corp., which recently posted the highest quarterly profits ever earned by a U.S. company, want to lock horns with IBM, AT&T and the other firms well-established in that arena?

The energy crisis has much to do with it, some observers believe. As petroleum reserves dwindle and the world shifts to other sources of energy, Exxon's profits

Analysis

will decline unless the mammoth firm finds better ways to turn a buck.

Not that there is immediate danger of such a decline. Last year, Exxon had sales that exceeded the combined gross national products of the Philippines, New Zealand and Israel. Its sales were nearly triple those of IBM, a recent report from The Conference Board showed.

But some computer industry analysts regard the debut of Intecom's Series 40 Integrated Business Exchange (IBX/S40) as a sign that Exxon will soon start coordinating Intecom product lines with those of the other 14 DP-related vendors controlled by its Exxon Enterprises, Inc. subsidiary. Established in 1969, Exxon Enterprises is the holding company for Exxon

(Continued on Page 120)

Although Order Rates Dipping

Pundits See Industry Braving Recession

By Marcia Blumenthal
CW Staff

Although computer industry analysts are beginning to see some signs of diminishing demand for DP products, on the whole they do not think a recessionary economy will severely impact the industry.

Inflation rather than recession will persist as the most insidious problem, continuing to take a toll on vendors' earnings over the next several quarters, the analysts predicted.

As for recession, "the question is whether users are going to spend money," Frederick Withington, a vice-president at Arthur D. Little, Inc., said. "Up until three weeks ago, there were no signs that users were slowing down their purchases," but since then he has noticed a few indicators that users are getting cautious.

Withington thinks DP managers are not cutting back, but rather being more diligent about staying within their budgets. In the past, DP departments would tolerate some budget overages, he maintained.

Although it appears a recessionary economy will continue at least through the end of the year, Withington thinks its impact on the industry will be selective rather than across-the-board, as it was in 1974 and 1975. "Those firms with momentum and product popularity will do well, but firms that are not fully competitive will be hit," he forecast.

Slower Order Growth

User caution is already showing up in many vendors' order rates, which many analysts agree are not growing as fast as last year. William Easterbrook, a vice-president with Kidder, Peabody & Co., Inc., estimated industry order rate growth this year at 13% to 14% compared with last year's 21%.

IBM had predicted a 10% order growth for its first quarter, but orders increased only 5% to 6% from last year's levels, he noted.

And NCR Corp.'s U.S. orders are down 6% to 10% for the first quarter, although its

(Continued on Page 110)

Despite Hurdles, Women Easing Into Sales Jobs

By Ann Dooley
CW Staff

FRAMINGHAM, Mass. — Does it help or hurt to be a woman in computer sales?

Saleswomen occasionally encounter on-the-job prejudice from customers and colleagues and also face difficulty breaking into the high-ticket hardware sales. But as women they may also hold certain advantages.

So said half a dozen successful saleswomen representing a variety of large and small computer vendors from around the country. The majority of women interviewed started their careers with a technical background and moved into sales not only to achieve greater recognition but, more importantly, for higher pay.

Although most of the women think being female makes no difference in establishing a career in sales, they agreed women have not yet been totally absorbed into the sales force.

(Continued on Page 119)

Carter Sets Tighter Controls On Exports of Semis to Soviets

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — New restrictions on exporting silicon and semiconductor manufacturing equipment to Soviet Bloc countries have been instituted by the Carter Administration as part of its get-tough stance toward the Soviet Union.

The new restrictions were announced on May 5 by the Commerce Department, lead agency in controlling exports, as part of the government's U.S.-USSR trade review initiated by Carter in January following the Soviet invasion of Afghanistan.

At that time, all technology exports to the Soviet Union were frozen. In March, the Administration produced tougher, across-the-board controls on trade of high-technology items, including computer hardware and software, to the Soviets.

As a result of last week's action, exports of electronics-grade silicon, silicon deposition equipment and semiconductor sawing and surface finishing equipment will now require approval of the export administration office, which reviews proposed sales of sophisticated DP equipment to communist countries.

By adding these items to the Commodity Control List, the government hopes to head off any Soviet attempt to acquire advanced silicon wafer production technology from the U.S., according to the Commerce Department.

The Administration announced in March that few if any items on the list would be approved for sale to the Soviet Union.

(Continued on Page 112)

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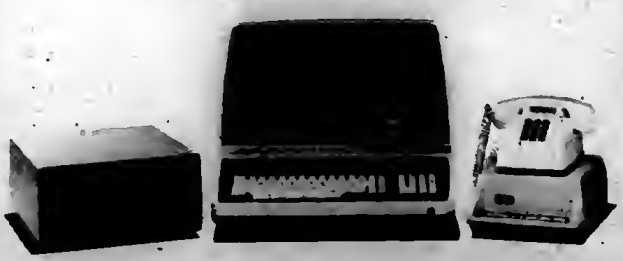

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Pundits See Industry Escaping Recession's Worst

(Continued from Page 109)

overall order rate growth is up about 3% thanks to strong overseas bookings, analysts observed.

Easterbrook pegged overall industry growth at about 11% to 12% both this year and in 1981, compared with a 15% growth rate in 1979.

Impact of Inflation

While the industry growth rate may be sluggish, Withington is more concerned about the impact of inflation. "Companies can ship all they want, but still make no money," he explained.

The industry is becoming much more inflation-intensive, Withington observed, stressing the growing labor component of vendors' organizations.

"It's harder for a company to convince a user that its data base manager is a better product than it is to convince a prospective customer of hardware benefits," he contended. This means increased marketing costs.

In attempting to counterbalance increases for marketing costs, field engineering and software development, vendors are constrained by the amount they can raise prices. Withington noted even IBM has pricing limits: "If the umbrella gets too high, the Japanese, particularly Fujitsu with its M series, will be here soon."

Withington's scenario for cost containment requires vendors to build more maintainable machines, unbundle software and standardize system programs. He admitted that this is not a revolutionary idea and that many vendors are already doing this; the hitch, however, is that it takes years before a vendor's product line can be turned around.

Inflationary pressures are already being seen as analysts lower earnings projections for many computer vendors. Recently, Shearson Loeb Rhodes, Inc. lowered NCR's projected 1980 earnings from $10.25 per share to $9.25 per share and IBM's from $6.20 to $5.35 per share.

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Amdahl, STC OK Merger

SUNNYVALE, Calif. — The boards of directors of Storage Technology Corp. (STC) and Amdahl Corp. have approved the merger of the two firms.

Although the definitive agreement has been signed, shareholders for both firms still must approve the merger of the two firms into one new firm. Accordingly, both companies will hold special shareholders' meetings in late June or early July, according to an STC spokesman.

Under the terms of the agreement, STC stockholders will receive one share of the stock of the new combined company for each share currently held. Amdahl stockholders will receive 1.25 shares for each share held.

The merger will be tax free to both Amdahl and STC shareholders and will be accounted for on a pooling-of-interests basis.

As previously agreed upon, Jesse I. Aweida, now chairman and president of STC, will be chairman and chief executive officer of the new firm. Eugene R. White, now Amdahl's chairman and chief executive officer, will be deputy chairman of the new firm, while Amdahl President John C. Lewis will be president and chief operating officer.

Although details on the name and location of the new firm have not been disclosed, the STC spokesman said it looks as though Aweida will continue to work out of Louisville, Colo., while White and Lewis will continue to work in Sunnyvale.

Executive Corner

- Dr. Earl Jones has been named general manager of Genrad/Futuredata.
- Ira W. Cotton has joined Booz, Allen & Hamilton, a management and technology consulting firm.
- The DMW Group, Inc. has announced the appointment of three vice-presidents: Dr. Jack L. Digiuseppe, John Holland and Alan Lubin.
- Philip H. Gallo has been named vice-president of sales for Computek, Inc.

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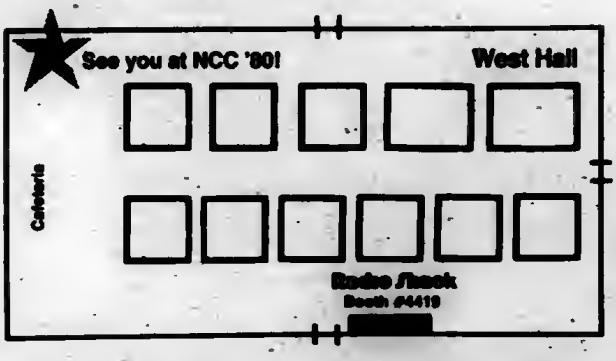

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Itel's Former Chief Buys Digital Scientific

SAN DIEGO — Digital Scientific Corp., a minicomputer maker here, has been acquired by Peter S. Redfield, former president of Itel Corp., and Nicholas Wallner, a private investor.

Founded in 1967, Digital Scientific's current product line is the Meta 4/5000, a minicomputer that emulates certain minis from General Automation, Inc. and IBM's 1130 and 1800 systems.

Redfield, who will become chairman of the firm, expects to play a major role in planning the company's future growth and development. Small business systems and a line of plug-compatible systems are among the directions being considered, a spokesman said.

Digital Scientific's current operating management will be retained.

The acquisition was made by a transfer of more than 90% of the privately held firm's stock to Redfield and Wallner.

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Calldata Wraps Up RCS Business With Sale to Interactive Sciences

By Marcia Blumenthal
CW Staff

WOODBURY, N.Y. — With a sale of a portion of its commercial remote computing services (RCS) business to Interactive Sciences Corp. late last month, Calldata Systems, Inc. has completed its departure from the RCS market.

Founded in 1975 as the commercial services subsidiary of Grumman Data Systems Corp., Calldata began divesting its RCS business last November when it transferred its retail applications business to Teledata, Inc. of Hanover, N.H.

The commercial RCS portion of Calldata's business represented approximately 40% of its total revenues, according to William Waas, the company's director of strategic planning. Industry sources estimate Calldata's annual revenues at between $9 million and $12 million.

Prior to the sell-off, Calldata offered a variety of commercial applications that ran on IBM, Honeywell, Inc. and Digital Equipment Corp. systems.

By June 1, all of Calldata's 10 regional sales offices will be closed; its data center in Newton, Mass. is reportedly for sale.

In all, about 250 employees have been laid off, according to Waas. However, he claimed that all of the employees — most of whom have already left the company — were given at least six weeks' notice. Most have already found other jobs.

Reasons for Exit

Although the firm had been examining the profitability of its RCS business since September [CW, Feb. 11], Waas would not comment on the apparent financial problems that necessitated Calldata's exit from this segment of the services industry.

Sources say, however, that Calldata never made the transition from raw time service sales to industry-oriented applications sales. Moreover, pointing to the firm's diverse equipment base, one observer speculated that Calldata was trying to "be all things to all people."

Waas did say that Calldata would be reentering the commercial services business in about a year with a specialized transaction processing service.

With the recent acquisition of Calldata's DEC-based Computility services, Interactive Sciences added about 60 customers to its current customer base of 500, according to John J. O'Toole, vice-president of marketing. The firm also purchased outright three Decsystem-10 processors from Calldata.

Earlier this year, Informatics, Inc. acquired the IBM-based RCS business. That segment is said to have a potential annual sales volume of $4 million, depending on how many of the 250 users opt to remain with Informatics, a company spokesman said.

In addition, Teledata, which over the years has developed applications software for retailers for Calldata, acquired the client base of about 200 users tied into a Honeywell/-Dartmouth Time-Sharing System. This client base was transferred to Teledata in February, according to Michael Prince, the firm's executive vice-president.

Prince maintained that transfer involved no interruption of services or access procedures for users.

Terms of Sales

While Calldata did not disclose the terms of the various sales, companies acquiring the client base will pay Calldata a percentage of the billings for a period of time, Waas said.

Although divesting itself of its commercial RCS business, Calldata will continue to perform RCS applications for a small amount of government business as well as internal aerospace applications for its parent corporation, Grumman.

Calldata will also continue to operate three other divisions of the company: Infoconversion, a micrographics and text editing service; its technical school, Grumman Data Systems Institute; and ADI Transportation, a consulting organization.

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Carter Tightens Controls On Semi Exports to USSR

(Continued from Page 109)

The export restrictions had been directed at the Soviet Union only, but the new controls on silicon items also apply to all Eastern bloc nations. This broadened approach is necessary, the Commerce Department said, to prevent diversion of these items to the Soviet Union from its allies.

Although the Soviets already produce sophisticated integrated circuits, they are thought to be having difficulty developing advanced silicon wafer technology, a Commerce official said, explaining the government wanted to ensure the technology is not acquired from the U.S.

Invoking national security, the department said, "the affected items could enhance the Soviet military capability to an unacceptable degree."

The department also said the U.S. "has already initiated negotiations" with its allies to head off any sales of these items to the Soviet bloc from Western suppliers. Pending the outcome of those negotiations, the U.S. has decided to unilaterally institute the new controls.

Although the restrictions went into effect immediately, the government is asking for public comments on the action by July 7. Commerce said it will consider the comments in developing final regulations on exports of silicon and wafer production equipment.

Contracts

Softech, Inc. has been awarded a development and maintenance contract for the standard executive, SDEX/M, which was sponsored by the Naval Electronic Systems Command.

The Collins Communication Switching Systems Division of Rockwell International Corp. will supply four additional Automatic Call Distribution systems to American Airlines to enlarge the airline's telephone network and increase reservations call capacity.

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PERKIN-ELMER

COM Vendors Urged to Eye European Market

By Marguerite Zientara
CW Staff

NEW YORK — There is a lot of potential for micrographics products marketing in Western Europe, but that market may disappear unless vendors take the initiative and show users how micrographics can interface with other technologies to remain viable in the future.

Those words of advice were delivered by Gerald G. Baker, Director of Market Research for the British firm G.G. Baker & Associates, at the recent 29th annual conference of the National Micrographics Association here.

"The die is by no means cast in the European market," Baker said, but added, "If we do nothing, the user base will fade away as users turn to other technologies."

Citing a recent survey to which 500 European users replied, Baker noted that 2% of the respondents thought they would not be using computer output microfilm (COM) by 1985 and 13% thought that new technologies — such as bubble memories and optical disk — would cause them to abandon the use of film by 1990.

In addition, the survey results showed current European users are critical of after-sales service resulting from manufacturers' needs to cut costs.

"On the other hand, jacket users are looking for new ways to store the medium, such as updatable fiche and automated rolls," Baker said. "Therefore it is an opportune time for updatable fiche manufacturers to enter this market."

And while Western Europe is 57% larger in population than the U.S. — with 340 million vs. 220 million — its usage of micrographics is only one-third that of the U.S., according to Baker.

Six Sectors

Before sharing his micrographics marketing statistics, Baker explained that Western Europe is broken up into six sectors for market research purposes: Benelux (including Belgium, Luxembourg and the Netherlands), France, West Germany, Scandinavia, the UK and Ireland, and "the rest," including Austria, Italy and Spain.

Basing his figures on a $2.20/British pound exchange rate, Baker noted that the total market share in Western Europe in December 1979 for equipment and supplies was $315 million, as opposed to the U.S.' approximate $1 billion market share.

As for recorders in use in Europe, 1979 figures indicate a total of 886 units, increasing to 1,218 by 1979 — a 17.5% yearly growth, Baker reported.

"The total population of recorders in Europe at the end of 1979 was under a third that of the U.S.," he noted, "so there must be great potential for growth in that market."

Datagraphix First

Of the 1,218 total of installed recorders, Datagraphix, Inc. claimed 32.2% of the installed population; NCR Corp. had 18.6%; Eastman Kodak Co. had 13.5%; Pertec Computer Corp. had 12%; and California Computer Products, Inc. had 9.5%, Baker indicated.

3M Corp. claimed 4.8% of the installed base, while Siemens AG had 2.7%, Benson had 2.6%, Laser-Scan had 1.3% and other vendors had 2.8%, he added.

Largest Segment

West Germany claimed the largest segment of the European micrographics market in 1979, Baker noted, with $120 million in hardware and supplies, $40 million in services, 289 recorders in operation and 4.7 recorders per million inhabitants in the country.

With a bank rate of 7%, Baker said, the actual West German market growth is 18% to 20%.

The second largest 1979 European micrographics market was in the UK and Ireland, with $87 million in hardware and supplies, $35 million in services, $10 million in micropublishing, 223 systems in operation and 3.8 recorders per million inhabitants, Baker said.

That area's bank rate is 17%, with market growth of 21%. However, inflation approaching 20% results in "very small true growth," Baker explained.

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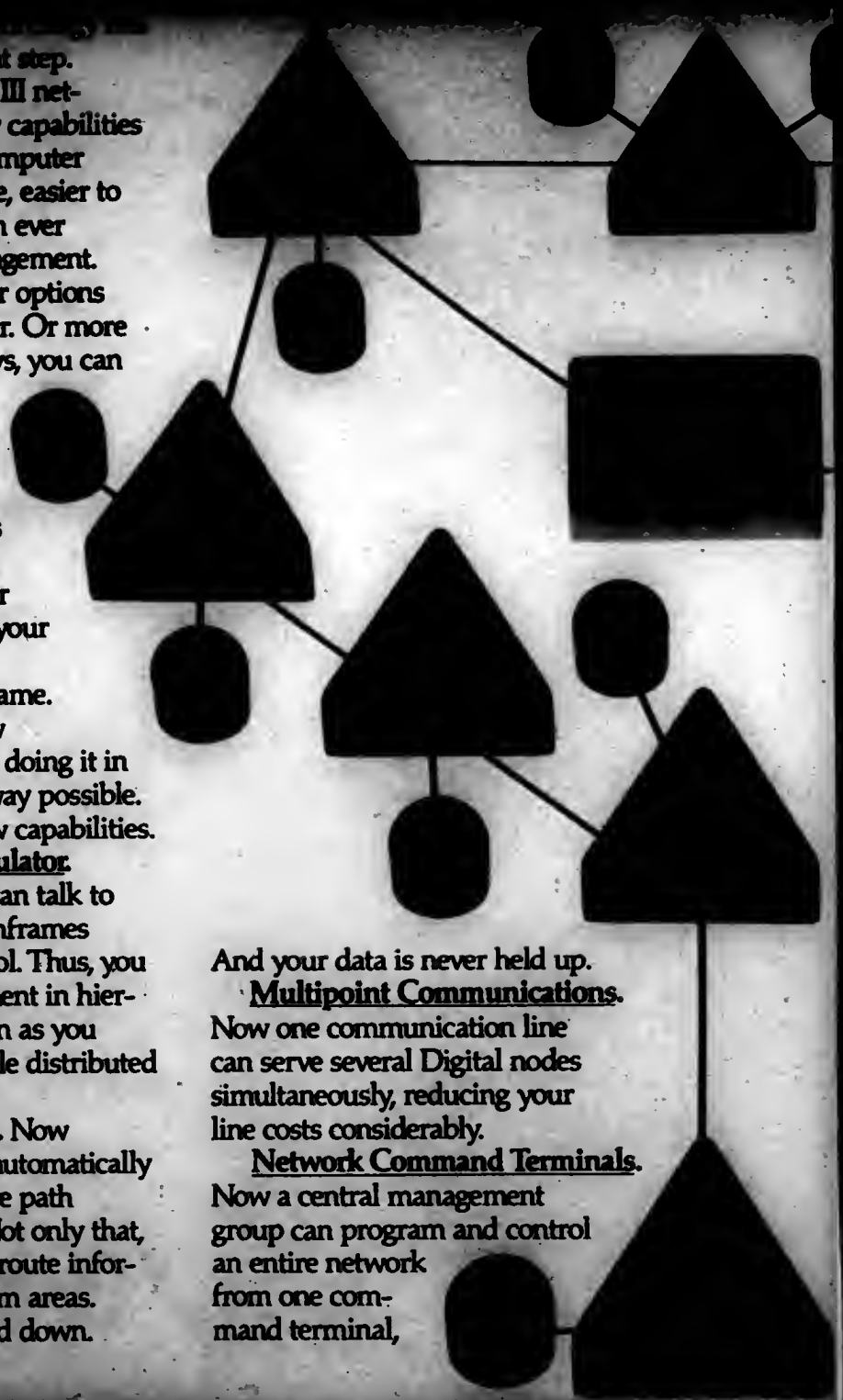

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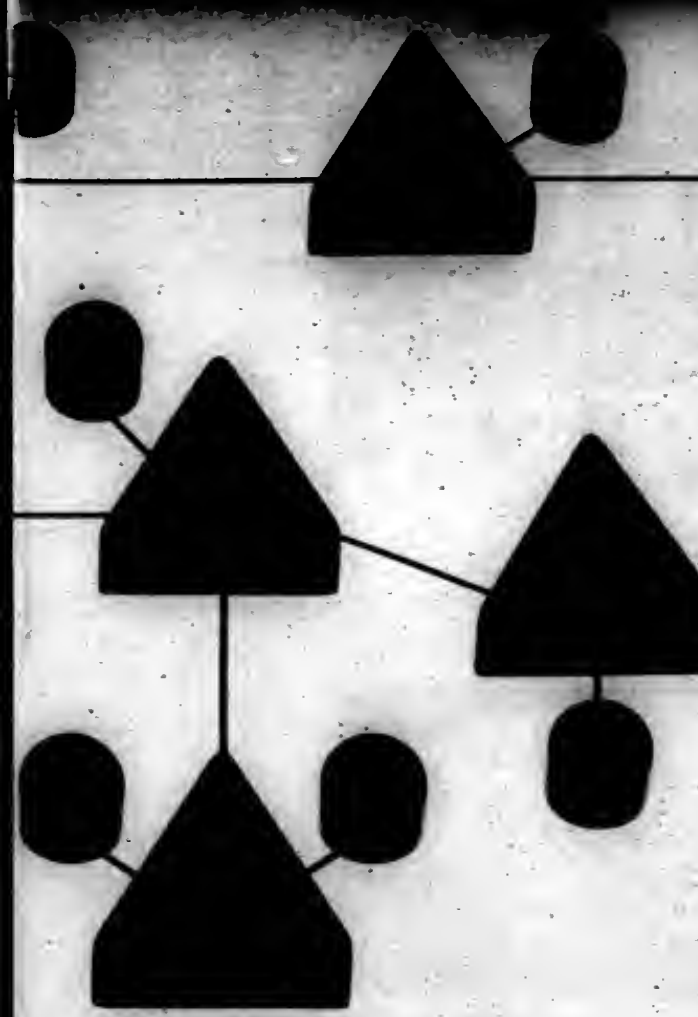

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Qantel Eyes Expansion in Merger With Mohawk

By Jeffry Beeler
CW West Coast Bureau

HAYWARD, Calif. — For many smaller, independent computer firms bent on rapid expansion, the prospect of "going it alone" has lost much of its traditional appeal, and the urge to merge — especially with much larger firms — has grown in popularity.

One small company for which the thought of a merger apparently holds great attraction is Qantel Corp., a locally headquartered small business systems supplier.

Qantel recently signed a letter of intent in which it agreed in principle to be acquired by Mohawk Data Sciences Corp., a Parsippany, N.J.-based manufacturer of intelligent key data entry terminals and distributed processing equipment.

The proposed acquisition, which still awaits approval of the respective companies' directors and stockholders, is expected to be completed as early as next month, according to Qantel President Douglas Baker.

If the proposed merger gets the green light — and all signs suggest it will — Mohawk would acquire Qantel's 2.25 million to 2.75 million shares for $31.5 million to $38.5 million.

Under the tentative agreement, Mohawk would issue one share of its own stock for every 20 shares of Qantel's — a conversion ratio that, depending on the status of Qantel's profits and order backlog, could change by plus or minus 10% between now and Sept. 30.

'One Fell Swoop'

For Qantel, the proposed acquisition means an opportunity to increase, in one fell swoop, its field service organization, size and market penetration without having to boost its level of capital spending.

If the small business systems supplier had attempted a comparable expansion outside the framework of a formal acquisition, the costs almost certainly would have proven prohibitive, Baker said.

In particular, the merger would allow Qantel to broaden its potential customer base substantially by giving it an entry to Mohawk's target market, which consists mainly of large government agencies and Fortune 500 companies.

As a vendor specializing in selling to first-time users, Qantel has never before had access to the types of customers that account for the bulk of Mohawk's sales, Baker said.

A merger of the two firms would also strengthen Qantel's customer support capability by addding Mohawk's current network of 120 field service locations to the 60 such sites the small business systems supplier already operates.

Combined Forces

As a single entity, Qantel and Mohawk would boast almost 5,000 employees, of which the small systems manufacturer itself would account for about 800.

Within a year or so of their merger, Baker added, the two companies would also boast a combined annual revenue of approximately $300 million, compared with the $75 million Qantel expects to gross this year on its own.

In a recent interview, Baker described the seemingly imminent Qantel-Mohawk union as a "natural fit," and "excellent synergism" and a "very compatible relationship." On the domestic scene, for example, Qantel's and Mohawk's main markets dovetail almost perfectly, and much the same can be said of their international markets as well. In Europe, Mohawk's strength offsets Qantel's weakness, and in Asia, the converse is true, Baker said.

Another potential area of compatibility between the two firms is their respective product lines. Baker foresees the possibility, for example, of using Mohawk's distributed processing expertise to add a networking capability to Qantel's traditionally stand-alone systems.

At the moment, however, neither Qantel nor Mohawk is far enough along in its merger negotiations to have had much of a chance to think about where the two firms' product lines might be complementary, Baker said.

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Women Easing Into Sales Jobs Despite Hurdles

(Continued from Page 109)

While many firms are now eager to hire women, most saleswomen are still barred from selling high-ticket items, the women claimed.

Some respondents praised their company's hiring practices regarding women; others said they advanced in spite of, not because of, their company's policies.

One woman said her company's attitude is "not to pound the pavement for women, but not to turn them away either."

Angry Respondent

A respondent who asked not to be identified spoke angrily about her work experience. Although she has not encountered any bias from customers, she stated that most problems stemmed from her own peer group.

With a software background, she decided in the early 1970s to move into sales as a way to make more money. However, she felt forced to use only her first initials in her name on her resume so an executive would not know she was a woman.

Although she said attitudes have changed since then, she still thinks women are held back, especially in the high-ticket hardware sales area.

Commenting on the problems saleswomen face, she contended that women have to prove themselves to be more technically qualified than men. "I establish my credentials early in the conversation and there is never a problem with clients," she asserted.

"It's only the salesmen who have their own egos to build who judge women a little harder — and the weaker the ego, the harder they judge."

Another problem saleswomen can encounter is in developing a "sales personality," according to saleswoman Janice Sheppard. Women are typically not as aggressive as men and often have to work to develop the assertiveness necessary for sales.

But Sheppard and Tricia Nuskin, both district sales managers for MDB Systems, Inc. — which boasts an all-women sales force — look positively on the overall chances for women in sales.

Possible Pitfalls

Commenting on possible pitfalls, Nuskin noted that women must have a thorough knowledge of the technology. Dealings with engineers vary, according to Nuskin, but many do not believe a woman would have the technical expertise that a man would have — "It's my job to prove them wrong."

Agreeing with Nuskin was Carolyn Morris, former saleswoman at Hewlett-Packard Co. Morris said she experienced some resistance by customers who did not like women to have the power to deal in business.

To counteract this, Morris said she had to quickly establish her authority and expertise — something that is not given as automatically to a woman as it is to a man, she claimed.

The women noted, however, that prejudices could sometimes work to their advantage.

Customers — mostly men — are still not completely used to saleswomen and will frequently agree to a meeting just to see what the saleswomen are like, they noted.

But once in that door, the women agreed that curiosity no longer helps and that they are expected to prove their professionalism and expertise.

Even though the industry exhibits some prejudices, according to the respondents, saleswomen are being accepted in increasing numbers largely because of the forward-thinking nature of an industry that is younger and more aggressive than most.

Lani Ridley, a Prime Computer, Inc. saleswoman, agreed. Not as easily accepted in sales years ago, Ridley said she had to start at the bottom and work her way up, but believes sales success today is based on the individual and is no easier or harder for a woman than for a man.

Although agreeing that DP companies are hiring more saleswomen, former saleswoman Morris, now product manager at HP, complained that companies are not providing women with avenues into management. And women have never been coached to climb up by themselves, she said.

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Exxon in DP: Why?

(Continued from Page 109)

Corp.'s venture capital operations.

As shown in the box on the right, the 15 vendors within the Exxon Information Systems (EIS) division of Exxon Enterprises fall under four headings.

Some of the organizations — most of which Exxon officials prefer to describe as "affiliates" — are not presently addressed to DP per se.

But they soon will be, according to Yankee Group researchers and others watching the trend toward integration of DP, word processing (WP) and voice functions.

This is the first half of a two-part series. Next week: more on Exxon's relation to the computer industry.

Two EIS affiliates well-known to DPers are Zilog, Inc., the Cupertino, Calif., chipmaker, and Ramtek Corp., a Santa Clara, Calif.-based supplier of CRT terminals. Exxon Enterprises bought control of Intecom last year. The IBX/S40 is the Dallas firm's first major product announcement.

What are all these organizations up to?

The nature of the product lines and research projects generated by the 15 EIS organizations suggest to some industry observers that Exxon Corp. wants a strong position in the marketplace where the DP, telecommunications and office equipment industries are fast converging.

And Intecom's projected family of communications supercontrollers may lead the assault, several market analysts have told *Computerworld*. That system, based on redundant 32-bit Perkin-Elmer Corp. minicomputers, is claimed by Intecom to allow integration of data and voice channels at speeds as fast as 56K bit/sec over standard telephone lines and satellite bands.

The IBX/S40 design calls for twisted pairs of copper cabling between the user's workstations — which would not require modems — and subsystems, based on Zilog's Z80 microprocessors, that front-end the system's central processors. By not employing coaxial or optical fiber cabling at that level, Intecom has lessened the user's need for site rewiring, a Yankee Group researcher observed.

That's important to users because rewiring of the local link can double the user's costs of acquiring and installing a system like the IBX/S40, he explained. The supercontroller reportedly offers comprehensive conversion of communications protocols and data formats, allowing dissimilar user peripherals to communicate easily.

Some industry watchers regard as Intecom's stiffest competition right now the SL-1 data/voice switching system of Northern Telecom Systems Corp. (NTSC) and Bell's Dimension 400 and 2000 private branch exchanges (PBX). Bell and IBM are also known to be developing strong runners for the supercontroller sweepstakes, slated for debuts later in the 1980s.

According to one expert in PBX demand, Northern Telecom International bought Sycor, Inc. and Data 100 Corp. and formed NTSC partly to initiate production of a supercontroller product line. Intecom happens to be managed by former employees of Danray, a Dallas PBX maker that is now an NTSC division.

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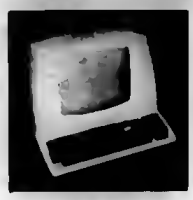

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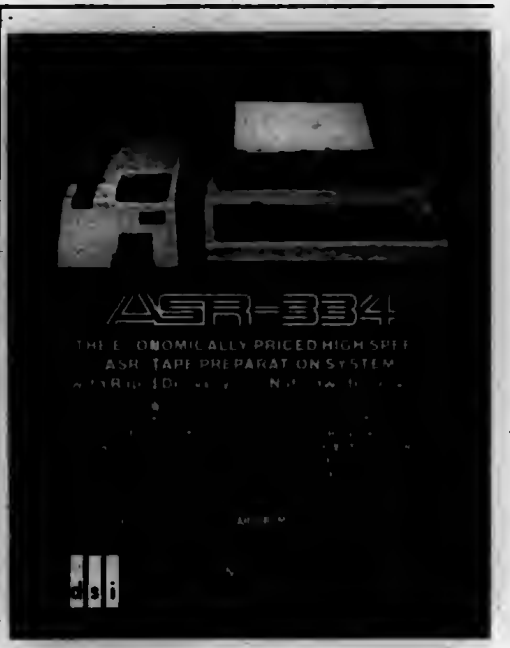

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$2,000 REWARD for EDP PROFESSIONALS

We're Interstorth, the pace setting, 2.3 billion dollar energy-based company that's increasing America's energy options. We've changed our name (formerly Northern Natural Gas Company), but not the opportunities we offer experienced EDP professionals. Our activities are diverse; natural gas, LNG, propane, coal and petrochemicals. From Alaska, the Gulf of Mexico, Canada and the continental U.S. On shore and off shore. Our operations range from natural gas transmission, exploration, to large petrochemical complexes. Rapid expansion of our alternative energy programs has generated superlative career opportunities.

If you have the qualifications to join Interstorth in any of the following positions, we'll pay you an employment bonus consisting of $2000.

Mechanical Engineer

You will be researching and developing computer-based solutions to engineering problems in thermodynamics, heat transfer, compressors, vibrations, air pollution, etc., and will develop the computer software for these applications. This position offers "total project" opportunities—you will have project responsibility from problem definition through implementing the solution. You will be working in a central scientific computing support unit that offers both technical and managerial career paths.

The wide range of engineering problems and independent work opportunities offered by this position provides an excellent growth opportunity for a professional having an engineering degree and at least 1-4 years experience with engineering applications on computers. A mechanical engineering background, experience with engineering systems on large scale computers, and a working knowledge of FORTRAN or BASIC are desirable.

Scientific Applications Development

Our scientific computing department needs analysts with a Computer science or scientific degree and a minimum of 1-2 years experience to implement a variety of petroleum engineering and geological applications related to the Natural Gas business. Capability is needed in systems analysis and program design along with a good working knowledge of FORTRAN, ALGOL or PL-1, Timesharing, RJE, architecture of large scale systems and data base storage.

Responsibilities involve analysis, evaluation and implementation of new or existing process control computer applications throughout the Corporation. Depending upon your background, you may also be involved in system simulation activities and other related areas. Technical diversity and an ability to work independently are characteristics that will afford you exposure, much room to contribute, and an excellent opportunity for personal development and career growth.

We offer truly challenging opportunities for professional advancement. Our stimulating and congenial environment rewards personal motivation and creativity. Advanced and progressive management and personnel policies are a hallmark of Interstorth. Benefits are excellent including company matching savings plan, physical fitness centers and full tuition refund. We offer a paid relocation plan including additional assistance with some of the problems you may encounter.

Our Omaha location provides you with the best of both worlds. Clean, uncrowded, hassle-free living, with excellent housing at reasonable cost. And, the educational and cultural resources and recreational facilities of a major progressive city.

To explore these unusual opportunities, please contact Mr. George Stockinger at 402-348-5534 or Mr. Jim LaHood at 402-348-4493, collect. If unable to call, send them your resume and salary history, in complete confidence to:

INTERNORTH
2223 Dodge Street, Omaha, Nebraska, 68102.
An Equal Opportunity Employer M/F
Agency referred applicants will not be eligible for this bonus.

INTERNORTH
Natural Gas. Liquid Fuels. Petrochemicals. Exploration. Coal

If you currently earn between $20,000 and $48,000 we've got a better job for you...NOW!

Every day you spend in the wrong job is a waste of time, money and talent...YOURS! Your talents and experience are in great demand and you can choose among many rewarding opportunities available in your field. But how?

Talk to the experts at Wallach. We've been successfully recruiting professionals like yourself for over 15 years.

Nationwide opportunities include technical/management consulting, project management, R&D, test and systems evaluation in the fields of Communications, Satellites, Weapons, Intelligence, Computer, Energy, and Aerospace systems. Specific skill areas include:

- Software Design
- Data Base Design
- Telecommunications
- Minicomputers
- Programming
- Signal Processing
- Digital Systems
- Microprocessor Design
- Systems Architecture
- Applications
- Command & Control
- Systems Programming
- Compiler Design
- EW/SIGINT/ELINT
- MIS/OPs Research
- Diagnostics

Don't waste another day in the wrong job! Call Perri Reeder collect at (301) 762-1100 or send your resume in confidence. We can find you a better job. Let us prove it to you...NOW!

WALLACH...Your career connection

Equal Opportunity Employer Agcy

WALLACH associates, inc.
1010 Rockville Pike
Box 6016
Rockville, Maryland 20852
(301) 762-1100

Mattel has big plans for Programmer Analysts and Systems Analysts

You'll tackle exciting developmental assignments, utilizing a broad range of the latest data processing technology: Data Base Systems, Interactive On-Line Systems, Telecommunications and distributive Processing. Plus you'll help us improve or modify existing programs—but not just one or two. Mattel has more than 700 programs to challenge you. Best of all, you'll be able to see your projects through to their successful completion.

Mattel runs a small, but active shop, one that's especially conducive to individual achievement and the resultant recognition. That's why our people stay longer than the industry average for programmers (1-1/2 years). It's also why we had a very high promotion rate last year among the Programming Analyst staff.

To qualify, you must have familiarity with the IBM 370/158 MVS OS and have two-plus years in COBOL (ours is primarily a COBOL shop).

We offer extremely competitive salaries as well as one of the best benefits packages in the industry. And with Mattel, you can always expect little extras like additional compensation for on-call duty, whether you're called in or not.

Even if your present situation is satisfactory, you owe yourself a look inside Mattel. Where we've got big plans for Programmer Analysts and Systems Analysts.

Please send resume and salary in complete confidence to:

Sandy Wales, Department R, Mattel Toys, 5150 Rosecrans Avenue, Hawthorne, CA 90250.

MATTEL

An Equal Opportunity Employer

Data Communications Engineers

If you'd rather SWITCH than fight... join the packet-switching leader

GTE TELENET

The fight is over. Packet switching is the winning technology in data communications. And GTE Telenet, the packet-switching pioneer, is now the national leader in a dynamic industry.

We're expanding the shape, scope, and capabilities of our nationwide data communications network, and we need YOUR help to meet our growth demands. By joining Telenet now, you can build a career of extraordinary potential while you enjoy the stimulation and challenge of life on the cutting edge of data communications technology.

We seek engineers with data communications backgrounds at junior to senior levels, with BS, MS, and PhD degrees (or equivalent experience). Positions are available at our metropolitan Washington, D.C. headquarters facilities.

- Systems Engineers
- Network Engineers
- Design Engineers
- Product Engineers
- Switching Engineers
- Facility Engineers
- Electronic Engineers (Software Backgrounds)
- Field Service Engineers
- Project Engineers

Positions are also open to Data Communications Marketing Professionals, Technicians, Programmers, and Analysts.

You will enjoy the GTE Telenet environment—innovative, stimulating, challenging. And you will enjoy the growth potential and advancement opportunities inherent in our national leadership. A generous compensation/benefit package is still another reason to join us now. Send your resume in complete confidence, including salary requirements, to: Douglas B. Macaulay, Manager of Employment, GTE Telenet, 8330 Old Courthouse Road, Vienna, VA 22180. An equal opportunity employer m/f/h.

GTE Telenet
The data network
A part of GTE

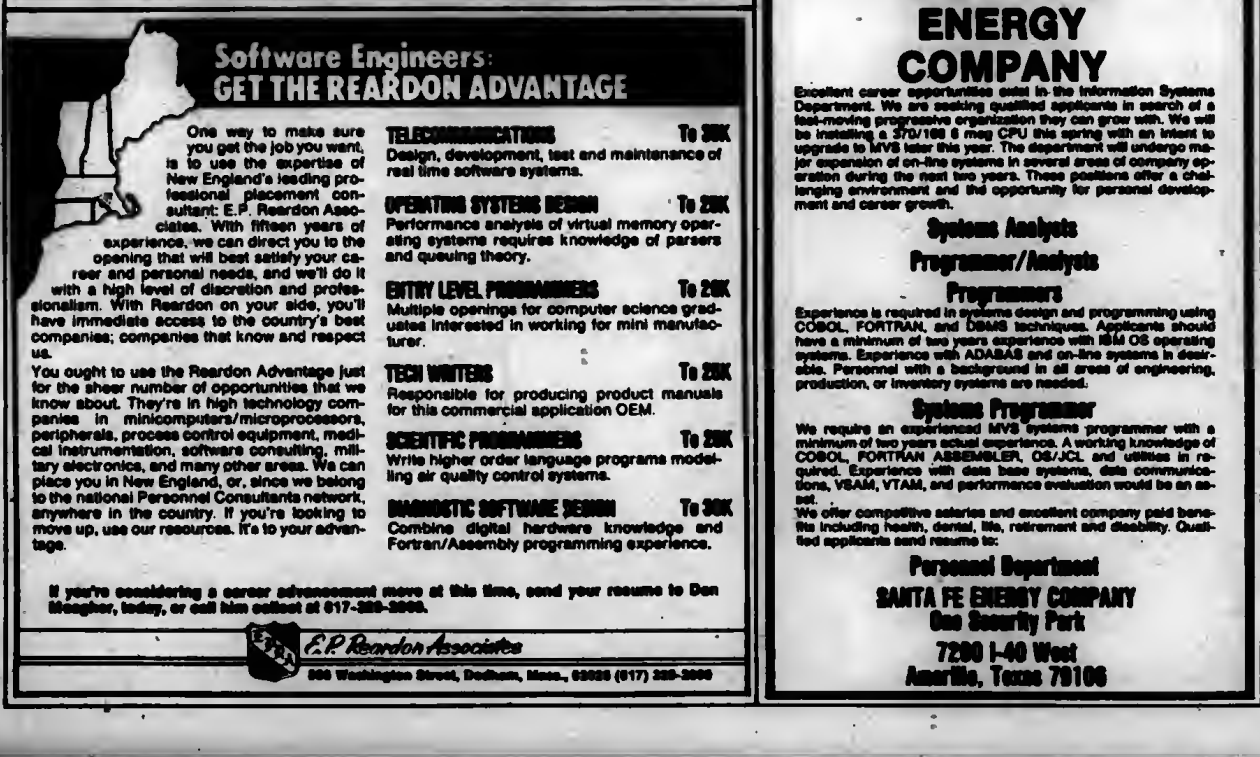
EDP OPPORTUNITIES

are booming...locally and nationally

There's no recession in the computer careers market. All our offices report unprecedented highs in the demand for qualified personnel. To the computer professional, this represents an unparalleled opportunity for career advancement. At NCA you will be shown a wide variety of exceptional positions, all totally detailed, from which you can select those with most appeal.

NCA can easily place you in the position you want whether it's across the street or across the country. There is no charge to you because company clients assume our fees. Visit the NCA office nearest you. Or call. Or mail your resume.

National Computer Associates



Software Engineers: GET THE REARDON ADVANTAGE

One way to make sure you get the job you want, is to use the expertise of New England's leading professional placement consultant: E.P. Reardon Associates. With fifteen years of experience, we can direct you to the opening that will best satisfy your career and personal needs, and we'll do it with a high level of discretion and professionalism. With Reardon on your side, you'll have immediate access to the country's best companies; companies that know and respect us.

You ought to use the Reardon Advantage just for the sheer number of opportunities that we know about. They're in high technology companies in minicomputers/microprocessors, peripherals, process control equipment, medical instrumentation, software consulting, military electronics, and many other areas. We can place you in New England, or, since we belong to the national Personnel Consultants network, anywhere in the country. If you're looking to move up, use our resources. It's to your advantage.

TELECOMMUNICATIONS To 30K
Design, development, test and maintenance of real time software systems.

OPERATING SYSTEMS DESIGN To 28K
Performance analysis of virtual memory operating systems requires knowledge of parsers and queuing theory.

ENTRY LEVEL PROGRAMMERS To 20K
Multiple openings for computer science graduates interested in working for mini manufacturer.

TECH WRITERS To 25K
Responsible for producing product manuals for this commercial application OEM.

SCIENTIFIC PROGRAMMERS To 25K
Write higher order language programs modelling air quality control systems.

DIAGNOSTIC SOFTWARE DESIGN To 30K
Combine digital hardware knowledge and Fortran/Assembly programming experience.

If you're considering a career advancement move at this time, send your resume to Dan Meagher, today, or call him collect at 617-329-2900.

E.P. Reardon Associates
900 Washington Street, Dedham, Mass., 02026 (617) 329-2900

SANTA FE ENERGY COMPANY

Excellent career opportunities exist in the Information Systems Department. We are seeking qualified applicants in search of a fast-moving progressive organization they can grow with. We will be installing a 370/168 6 meg CPU this spring with an intent to upgrade to MVS later this year. The department will undergo major expansion of on-line systems in several areas of company operation during the next two years. These positions offer a challenging environment and the opportunity for personal development and career growth.

Systems Analysts
Programmer/Analysts
Programmers

Experience is required in systems design and programming using COBOL, FORTRAN, and DBMS techniques. Applicants should have a minimum of two years experience with IBM OS operating systems. Experience with ADABAS and on-line systems is desirable. Personnel with a background in all areas of engineering, production, or inventory systems are needed.

Systems Programmer

We require an experienced MVS systems programmer with a minimum of two years actual experience. A working knowledge of COBOL, FORTRAN, ASSEMBLER, OS/JCL and utilities is required. Experience with data base systems, data communications, VSAM, VTAM, and performance evaluation would be an asset.

We offer competitive salaries and excellent company paid benefits including health, dental, life, retirement and disability. Qualified applicants send resume to:

Personnel Department
SANTA FE ENERGY COMPANY
One Security Park
7200 I-40 West
Amarillo, Texas 79106

Prime opportunities. Find them at NCC '80.

We are looking for people with computer experience in Sales, Systems, Field Engineering, Marketing Planning & Development, Engineering, and Research & Development. If you are one of these folks we want to give you the opportunity to discover what it is like to work for the most exciting computer company in the world.

During your visit to the NCC we extend an invitation to you to meet with us to discuss your skills and the outstanding opportunities we offer. Our formula is simple – if you are very good we'll treat you that way.

Sales, Systems & Field Engineering

If your track record shows that you can sell, you should know that we place no cap on earnings for Marketing Reps; we have an accelerating commision plan. The more you sell the more you earn. The Systems and Field Engineering environments at Prime are alluring – personally, financially and professionally – just ask us to show you.

Marketing Planning & Development

In a state-of-the-art environment, interface on product and market strategies with functional elements throughout the corporation. Discover how our remarkable growth has created personally rewarding and professionally challenging opportunities in product planning, market planning and development, training, and corporate communications.

Engineering and Research & Development

Apply conceptual and creative design ability in many new and existing product areas in Engineering; conduct independent research in R & D; work in an environment where we ask you to develop, drive, sell, and implement your ideas.

To arrange for an interview.

During your visit to the NCC, call (714) 975-0262, or send your resume to PRIME COMPUTER INC., 21052 Oxnard Street, Woodland Hills, California 91367.

PRIME Computer

Booth 2353

SYSTEMS ENGINEERS
SOFTWARE ENGINEERS
HARDWARE ENGINEERS

At NCC...

The Choice Is Yours.

NCC Interviews

Members of our Technical Management will be available for interviews at NCC. To arrange an appointment, please phone Joe Dugan in Anaheim at (714) 535-0300, Monday, May 19th through Thursday, May 22nd.

If unable to meet with us at this time please forward your resume to Joseph A. Dugan, GTE's Sylvania Systems Group, Strategic Systems Division, 189 "B" Street, Needham, MA 02194.

an equal opportunity employer M/F

There will never be another opportunity like this... an opportunity to choose from such a broad range of disciplines and responsibilities.

Be a part of the largest systems program ever undertaken. The Strategic Systems Division of GTE's Sylvania Systems Group has embarked on the largest and most complex C^3 system ever conceived. The challenges and opportunities presented by this long-term program are mind-boggling.

The MX C^3 program will involve a hierarchy of over 5000 computers, one of the largest computer networks ever developed; the world's largest fiber optic cable network, over 15,000 Kilometers; and a radio communications system incorporating over 600 VLF, MF, HF, VHF, UHF, and SHF radios.

Although the design, development and implementation of this system will extend far into this decade, the real challenges and opportunities exist now, at the beginning. The capability demonstrated by Strategic Systems Division in winning this program will be applied to future major programs. We are committed to being the major strategic systems organization of the future.

Opportunities for Engineers exist at every level of experience up to managerial in the broadest range of disciplines available anywhere. There will never be another opportunity like this...an opportunity to choose from such a broad range of disciplines and responsibilities.

Systems Analysis

Concept Development

- ☐ C^3 Operational Concept Development
- ☐ Command and Control Analysis
- ☐ Trade Studies and Analyses
- ☐ Definition of Communication Interfaces

Simulation and Modeling

- ☐ Network Traffic Modeling
- ☐ Math Modeling and Simulation to Validate System Performance
- ☐ Trade Studies and Analyses
- ☐ C^3 Simulation Requirements

Systems Architecture

- ☐ Nodal Integration
- ☐ Multi-Subsystems Activities and Trade Studies Coordination
- ☐ Development of Nodal Equipment Block Diagrams
- ☐ Trade Studies and Analyses
- ☐ Interface Design

SEA and Integration

Operational Analysis—Cable Systems

- ☐ Cable Architecture Requirements
- ☐ Cable System Requirements
- ☐ Data and Voice Terminal Requirements
- ☐ Timing and Synchronization
- ☐ HW/SW Partitioning
- ☐ Secure Interfaces
- ☐ BIT/BITE Requirements

Operational Analysis—Radio Systems

- ☐ Radio Architecture Requirements
- ☐ Radio Systems Requirements
- ☐ Radio Terminal Requirements
- ☐ Antenna Requirements
- ☐ Timing and Synchronization
- ☐ HW/SW Partitioning
- ☐ BIT/BITE Requirements
- ☐ Secure Interfaces
- ☐ Airborne Radio Requirements

Operational Analysis—Command & Control Systems

- ☐ Nodal Considerations/Integration
- ☐ Commands
- ☐ Status/Maintenance Requirements
- ☐ Processors/Memory
- ☐ Displays
- ☐ Security
- ☐ Secure Equipment and Interfaces
- ☐ Sub-system Interface Definition
- ☐ Communication Integration/Interface and Controls
- ☐ System Simulation Requirements

Operational Software

- ☐ Higher Order Language
- ☐ PDP 11 Architecture
- ☐ Computer Security
- ☐ Remote Software Change
- ☐ Communication Processing
- ☐ Real Time Command/Control Processing
- ☐ Compiler Development Support
- ☐ Bench Marking
- ☐ Performance Trade Offs
- ☐ Airborne Unique Software Requirements

Systems Integration

- ☐ Test Planning Analyses
- ☐ Logistic Support Analyses
- ☐ A & CD Technical Analyses
- ☐ Operational Analyses
- ☐ Maintenance Analyses

System Requirements Development

- ☐ Functional Flow Diagrams
- ☐ Forms B—Functional Requirements
- ☐ B-1 Prime Item Development Specifications
- ☐ B-5 Computer Program Development Specifications
- ☐ Operational/Maintenance Time Lines

Command and Control

Communication and Control Software

- ☐ Operating Systems Including Secure Operating System
- ☐ Communications Software
- ☐ Command Generation and Operational Status Monitoring Software
- ☐ CAMMS Software
- ☐ Code Processing Software
- ☐ Personnel Authentication Software
- ☐ Auxiliary Software
- ☐ Diagnostic Software

Systems Operability

- ☐ System Operability Concept
- ☐ Man-Machine Interface
- ☐ Displays and Controls

Processors and Interfaces

- ☐ Processors
- ☐ Bulk Store Technology
- ☐ Processor Interfaces
- ☐ Performance Trade-Offs

C^3 Subsystem

- ☐ Data Network Architecture Requirements
- ☐ MF Radio Protocols
- ☐ Fiber Optic Cable Protocols
- ☐ Communications Protocols
- ☐ Message Formats
- ☐ Message Responses

Radio Systems

Communications Measurements and Analysis

- ☐ Wideband Atmospheric Noise Measurements
- ☐ Rough Terrain Surface Wave Propagation Measurements
- ☐ Propagation Analysis
- ☐ Mobile VHF System Analysis/Design
- ☐ Communications System Testing Concepts/Analysis

Radio System Design

- ☐ Higher Order Modulating Technology
- ☐ Error Detection and Correction
- ☐ Spread Spectrum Communication
- ☐ Modeling and Performance Estimation
- ☐ Implementation Feasibility Considerations
- ☐ MF Radio Conceptual Design

Radio Network Design

- ☐ Radio Network Layout
- ☐ Protocols, Routing Algorithms, Multiple Access
- ☐ Simulcast Operation/Disciplines
- ☐ Performance Estimation, Reaction Times, Survivability
- ☐ Airborne Entry/Control

Antenna Systems

Shipboard Antennas Development

- ☐ VLF/MF/HF Buried Antennas
- ☐ Triplexer Development
- ☐ Directable HF Antennas
- ☐ UHF/SHF Satellite Terminal Antennas
- ☐ EMP Mitigation Techniques and ESA Requirements Definition

Ground-Based Antennas Systems

- ☐ Wideband MF Broadcast Antennas
- ☐ UHF/SHF Satellite Terminal Antennas
- ☐ VLF HF VHF and UHF Antennas
- ☐ VHF Mobile Radio Antennas

Airborne Antennas

- ☐ MF Trailing Wire Antennas
- ☐ MF Ferrite Loop Antennas
- ☐ UHF/SHF Satellite Antennas
- ☐ VLF HF VHF UHF and SHF Antennas

Cable Systems

Voice Communication

- ☐ Secure Voice Order Wire Communication
- ☐ Secure Voice Switched Network
- ☐ VHF Mobile Radio Communication

Data Communication Section

- ☐ Cable Data Network Architecture
- ☐ Cable Network Routing Protocol
- ☐ Network Traffic Modeling
- ☐ Survivable Cable Communication Network

Fiber Optic Communication System

- ☐ Fiber Optic Cable Connectivity
- ☐ Fiber Optic Modem Design
- ☐ Fiber Optic Cable Plant Design
- ☐ Fiber Optic Component Evaluation

Mechanical Systems and Interfaces

- ☐ Environmental Constraints Analysis
- ☐ MI & S (Mechanical)
- ☐ Packaging Concepts
- ☐ Components/Equipment
- ☐ Test and Analysis
- ☐ Requirements Specification
- ☐ Cable System Requirements
- ☐ Site and Facility Interface Requirements
- ☐ ICD Requirements
- ☐ A & CD Requirements

Security Systems

- ☐ Secure Communications Equipment Integration
- ☐ Computer Security
- ☐ Code Processing
- ☐ Security Studies

Hardness and Survivability

EMP Analysis and Test

- ☐ EMP Analysis
- ☐ NGEMP Analysis
- ☐ EMP Test
- ☐ Requirements Analysis
- ☐ Allocations Analysis
- ☐ EMI/TEMPEST

Radiation Analysis and Test

- ☐ Analysis
- ☐ Requirements Analysis
- ☐ Test

Special Studies

- ☐ Hardness Assurance/Maintenance
- ☐ Subcontractor Support
- ☐ Thermal/Mechanical
- ☐ Fiber Optics

Maintenance Systems

On-Line Maintenance Subsystem

- ☐ Subsystem Design
- ☐ Nodal Requirements Allocation
- ☐ Maintenance Management (CAMMS)
- ☐ Maintenance Monitoring and Control
- ☐ BITE, BIT, SELF TEST Requirements
- ☐ Fault Error Requirements
- ☐ Man-Machine Interface Functions
- ☐ HW/SW Allocations
- ☐ SW Architecture

Off-Line Maintenance Subsystem

- ☐ Intermediate Level/Depot Level MSE
- ☐ ATE Subsystem Design
- ☐ Integration of IL/DL Functions
- ☐ IL/DL Repairable Items
- ☐ IL/DL Test Requirements
- ☐ Test Station Requirements
- ☐ Operating and Diagnostic SW Requirements
- ☐ Test Applications SW Requirements

Organizational MSE

- ☐ Requirements
- ☐ Test Equipment—Fiber Optic, Antenna, ESA
- ☐ B-5 Portable Tester Specs

The Choice is Yours. Make it Now! Join the MX Team.

GTE | **Systems**

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Computer Systems Engineers...

Digital Equipment Corporation:

The Best Reason To Consider New England

Digital Equipment Corporation is the world's leading producer of interactive computer systems. First in minicomputers and in terminals. And we're growing fast. Come and talk to us while we're in town. And see why we're the best reason ever to consider New England.

Within our Maynard, Marlboro, and Tewksbury, Massachusetts facilities, you'll enjoy the unparalleled excitement of being right at the state-of-the-art. Our unique matrix environment will give you high visibility and the opportunity to define the parameters of your position.

Right now, positions are available for both hardware and software engineering professionals to work on new product development within our Maintainability Group. Here, you'll be involved in the planning, qualification and introduction of new hardware and software products spanning the entire spectrum of Digital products, and influence and enhance the product design process to ensure serviceability and customer satisfaction.

Digital in Massachusetts is the perfect place to make your living — offering an ideal environment. With easy access to the educational and intellectual resources of Boston, as well as the recreational attractions of Cape Cod and the mountains of Vermont and New Hampshire, you'll have the chance to enjoy the complete New England wonderland.

Discover the many other reasons to join us:

Drop By Or Call

Monday, May 19 through Thursday, May 22 10:00AM - 8:30PM
Costa Mesa Holiday Inn 3131 Bristol
(Bristol South Exit 76S Freeway)
(714) 557-3611

If you have a solid technical background, including a BSEE or equivalent, and experience in product development or field engineering, discover Digital while we're in town. And find out for yourself why we're the best reason yet for you to move to New England.

If you are unable to meet with us at this time, please forward your resume to Pauline Davis, Digital Equipment Corporation, Dept. S0611.3810, 129 Parker Street, Maynard, Massachusetts 01754. We are an equal opportunity employer M/F.

digital

EDP PROS

DATA BASE DEVELOPERS to $50K Northeast, Mid-Atlantic and Sun Belt. IBM environment.

SYSTEMS PROGRAMMERS to $50K COS, IBS, OS/VS, Mid-Atlantic, Northeast.

IBM SYSTEMS to $50K Language assistance with Assembler, PASCAL, MACRO.

VAX 750 SYST. PROG. to $50K Sun Belt, Northeast

CONTROL SYSTEMS to $50K Account, Inventory, utilities. Sun Belt, Mid-Atlantic, Northeast.

MPE SYSTEMS to $50K Managers, Analysts and Programmers. Northeast, Sun Belt.

All positions fee-paid. Call collect or forward resume to:

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P.O. Box 374
Hanover, NH 03755
(603) 643-0667
Placement Specialists

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ANALYSTS
SYSTEMS ANALYSTS
midwest, MID ATLANTIC
NORTHEAST, SOUTHEAST

When making a career decision you should have a choice of options.

Our clients — who run large and small systems in manufacturing, high technology, leading diversified/federated data, insurance, banking, and consulting — seek individuals with programming, analytical skills and/or leadership ability.

We individualize our search to meet your career objectives and geographical preferences.

We investigate professional opportunities offering a variety of challenges and environments.

Please contact or forward your resume to ERWIN KLAGSZ.

cp computer professionals
Data Processing Placement - Executive Search
15 Lewis Street, Suite 105, Hartford, CT 06103

Analysts/Engineers/Programmers

American Electric Power is conducting a New York "Power-House" Talent Search

American Electric Power, one of the leading energy producers in the United States' heartland, is looking for more talented professionals to help staff our New York office. New York has, and will continue to have the top professionals needed to meet the energy challenges of the 80's. If you're a top-talent professional, we invite you to read about our "Power-House" careers listed below.

Analysts/Engineers/Programmers

Our projects require individuals with a BS or higher degrees in engineering, operations research, computer science, or information systems to work on state-of-the-art projects involving:
- Real Time Process Control
- Management Decision Support
- Simulation and Modelling
- Data Bases

Salaries are commensurate with experience and education. We offer comprehensive benefit packages.

Please call Diana Mackey at 212-440-9103 or send resume including salary history and requirements in confidence to her attention: Dept. 271.

AEP AMERICAN ELECTRIC POWER SERVICE CORPORATION
2 Broadway, New York, New York 10004
An equal opportunity employer m/f

Programmer/Analysts

For Professionals Who Enjoy a Challenge ...

... APS offers you more. As a growing public utility company located in Phoenix, Arizona, we intend to remain on the leading edge using the very latest in software techniques. Exceptional growth and challenge are available to the dedicated professional, and our location in Phoenix features an excellent year-round climate.

Currently, we have an outstanding opportunity for Programmer/Analysts. The qualified applicant should have a minimum of 2 years experience in business applications programming and analysis with payroll experience desirable. Familiarity with IBM 370 hardware and PL/1, TSO, Panvalet and JCL software required with PL/1 and COBOL preferred.

If you'd like to work in a dynamic and rewarding environment, please send your resume along with salary history and requirements in strictest confidence to: Bryan Turgeon, Arizona Public Service Company, P.O. Box 21666, Station 1102-CW519, Phoenix, Arizona 85036.

aps.

An Equal Opportunity Employer M/F

TOTAL SYSTEMS INVOLVEMENT AT FAIRCHILD TEST SYSTEMS

You've always wanted it. Now you've got it.

With our industry-leading Sentry & Sentinel Groups in San Jose, California.

Or our Systems Products Group in Sunnyvale, California.

Total systems involvement with the industry leader in automated testing. That's what you can expect—right from the start—when you join the "First Family of ATE."

We're Number One because we provide our customer industries with total systems and support: Hardware, Software, Applications, Training, Worldwide Field Service and much more.

So if you're less than totally involved now,.. and if you want to be at the forefront of one of the 80's fastest growing industries, take a look at these opportunities:

SENTRY & SENTINEL GROUPS/SAN JOSE

We're looking for ATE experts who want the special challenge and reward that go with being the leader. We're determined to extend our technological leadership in ATE—and that means an increasing emphasis on R & D. These openings all require a degree in Electrical Engineering, Computer Science or the equivalent in solid experience.

Software Manager
You'll have overall responsibility for large software development projects and direct our Sentry software department.

Sr. Design Engineers
We need individuals with analog and digital experience and thorough knowledge of circuit design.

Sr. Systems Engineers
You'll be involved with either sub-nanosecond logic design, or with analog systems design.

Sr. Applications Engineers
You'll design, code, document and support assembly language system utilities which interface the OS and Sentry tester hardware with a device program. Experience with a variety of languages and machines is a must.

Senior Programmers
We're seeking top-notch professionals with assembly language background and programming experience with engineering-oriented minis or micros, compilers, OS, file managers, editors, I/O drivers, diagnostics, tester systems, etc.

Staff Engineers/Applications
These senior positions require experience in LSI test program development, including work with Sentry 7/FACTOR.

SYSTEM PRODUCTS DIVISION/SUNNYVALE

We need Software Engineers who can take advantage of design latitude with emphasis on personal innovation. If your ideas are not getting the attention they deserve, why not get involved at the beginning of a new project where you can influence a major new product direction.

We design computer systems that serve as Hosts to automatic test equipment. We need software engineers to get involved in operating system enhancements, data base management and design, networks, plus some statistical analysis and simulation in aggressive new product developments. In general, we are looking for people with at least a BS in Computer Science, or equivalent experience, with experience in PASCAL and FORTRAN. Some EE training and interest is also desirable.

Software Development Managers
These positions require six years of increasing responsibility in software development, including communications. At least three of these years should be in a software technical management capacity.

Sr. Software and Applications Engineers
We need software professionals with well rounded experience over at least four years including data management, communications, networking, and I/O.

Staff Software Engineers
These positions involve participation in the design and development of mini and micro processor based communication systems, as well as data base management and reporting systems. At least two years experience will be needed for these positions.

Call 998-0123 collect, extension 488, this week.

We're interested in you—not a resume!

Call Bob Elliott at the above number this week. He'll put you in touch immediately with the appropriate technical manager. If you won't be able to call, send your resume in confidence to Professional Staffing, Fairchild Test Systems Group, Dept.CW-12, 1725 Technology Drive, San Jose, CA 95110.

As an affirmative action employer, we encourage women, members of minority groups and the handicapped to apply.

Openings on the San Francisco Peninsula.

FAIRCHILD

A Schlumberger Company

PROCESS COMPUTER SPECIALISTS

Aramco will be interviewing in Anaheim May 19, 20, 21, 22

Aramco needs outstanding process computer specialists on the energy frontier in Saudi Arabia. We're offering outstanding incentives to get them, including up to 40 percent pay premium.

Aramco will be interviewing in Anaheim May 19th, 20th, 21st and 22nd.

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Aramco, the principal oil company helping the Saudi Arabian government develop its energy resources, is involved in projects that are overwhelming in scope, complexity and inventiveness.

The Company is dedicated to applying process computer systems to all areas. That's why we need some very talented process computer specialists. Openings are available immediately for direct foreign assignment, temporary USA project teams, or permanent domestic assignments, depending on your particular qualifications.

- Software Systems Engineers
- Hardware Systems Engineers
- NGL Process Engineers
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We require Process Computer Software Engineers with a B.S. degree in engineering, math or computer sciences, and 3 or more years' experience in various real-time processes, SCADA, projects, or process systems.

Process Engineers

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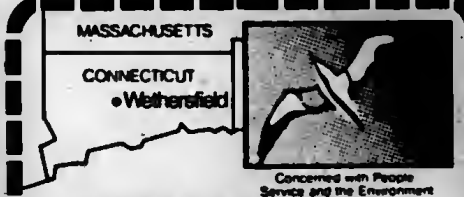

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The position requires 3 plus years of IBM Systems experience. CICS, DL/1 and VSM experience would be helpful, with 1 plus years in a supervisory capacity. Degree preferred although equivalent experience considered. Exposure in mining and accounting applications required. Will be responsible for the design, development, maintenance and implementation of all software systems.

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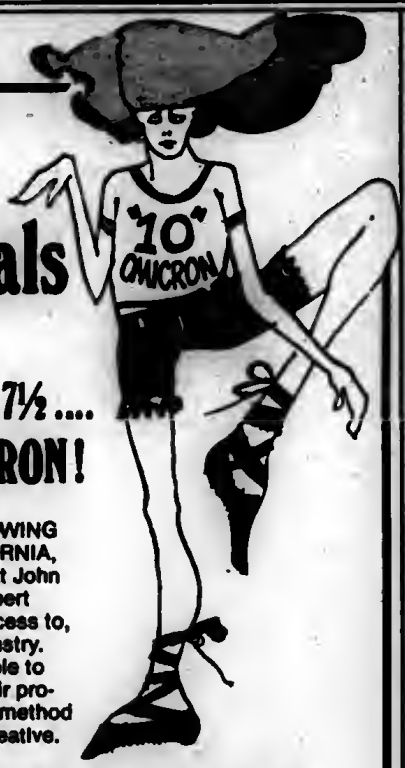

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Our nationally known clients, located throughout the Gulf Coast of Florida, are currently seeking experienced Systems Programmers. The successful candidates will be experienced in IBM, VM, DOS/VS, DOS/VSE, VSI, MVS and assembler languages; and will possess the background necessary to lead the Systems Software effort in a VM environment.

Salaries are competitive, the assignments are challenging and the opportunities for personal and professional advancement are realistic. Please submit your resume, in confidence, or call:

813-872-1853

frank leonard personnel

U.C.S. PROGRAMMER/ANALYST

Expanding data processing department requires individual with experience in Cobol to Host/3. We have a interlink II-6400 running under S-3 and online. We are in the process of developing communications for the remote sights.

If interested in this challenging position, please send resume and salary requirements to the attention of:

Don Vesley
S. S. Kresge Company
10 Wildwood Dr.
Woburn, Mass. 01801
an equal opportunity employer

SYSTEMS DEVELOPMENT

Rapidly expanding Nat'l Co. with Florida base has immediate openings for programmers and analysts. Need top quality professionals to develop and install nationwide network of SYS-34's and custom designed software for U.C. Cost Control. Top dollar paid to right people. Experience required with RPG and SYS-34. Send resume and salary history to Mideon Collins, DP Mgr., UCAC, Inc. 3737 Corporate Way, West Palm Beach, Florida 33407.

ADVANCEMENT OPPORTUNITIES
LOCAL or NATIONWIDE

Hundreds of listings — ALL LEVELS — top companies, all areas, all industries. Starting salaries $10,000 to $42,000. Companies pay fees and expenses.

Senior System Analysts	Project Mgrs./Leaders
Programmer/Analysts	Data Base Administrators
Application Programmers	Mgrs. Systems/Programming
System Programmers	Mgrs. EDP Auditing
EDP Auditors	Mgrs. Technical Support
Hardware/Software Analysts	Mgrs. Data Processing/MIS
Mini/Micro Professionals	Mgrs. Real System 3/34/38

For more details, send your resume, or call:

Mark Fuller
CADILLAC ASSOCIATES, INC.
32 W. Randolph St., Chicago, IL 60601
(312) 346-9400

As a software developer at Wang, you not only get plenty of personal freedom and day-to-day responsibility—you also get the chance to design your own future.

Because nothing says you have to follow a certain path to success.

For example, if you prefer to stay strictly on the development side of the business, you can move up to be a senior contributor, working on your own or with a team of your peers. On the other hand, if you'd like to lead others, there are plenty of opportunities in technical management—where you'll supervise people and direct projects.

Either way, you never have to worry about getting trapped in a no-growth position, or stuck in a job that just isn't your style.

The point is: We think the best way for you to get ahead is *your* way.

For more information, contact Susan Morse, Wang Laboratories, Inc., Dept. #000, One Industrial Avenue, Lowell, MA 01851. (617) 459-5000.

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WANG

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Systems Software Development.

VS/Performance Analysis

We seek computer professionals interested in experimentation and performance analysis; operating system architects with an in-depth understanding of resource management principles and strategies for maximizing I/O throughput. You will work with the latest in performance measurement tools, including a workstation emulator for load driving, synthetic workload applications, and both hardware and software monitors. Solutions will be applied in both data processing and word processing environments.

The Performance Analysis department's raison d'etre is to assess VS performance at the system level as an integral part of the overall development effort. The goal is to qualify how resource utilization varies as a function of application environment. Emphasis is placed on global design optimization and architectural alternatives for maximizing machine efficiency. We work closely with the other development organizations, following through on our recommendations to bring enhanced products to market.

Applicants should have a technical degree, or equivalent in training and experience, and significant exposure to the problems of designing and programming high performance, interactive computer systems.

VS/Firmware - Project Leaders

If you are a design-oriented systems development specialist who is not only comfortable with in-depth participation in hardware system architectural designs, but also experienced in development of virtual memory operating systems and other areas such as DBMS and communications, then we have a position for you.

Positions exist in development of current and future Wang Integrated Information Systems which covers both global and local designs of systems hardware architecture, microprogramming for distributed processing and operating systems integration. Interface with design engineers and systems programmers will be extensive.

VS/Firmware Development

If you enjoy the challenge of working with state-of-the-art microprocessors and advanced computer peripherals while utilizing advanced systems programming techniques and you are capable of planning and implementing new systems by working with hardware engineers and other systems programmers, we have a position for you.

Positions exist in research and development of intelligent I/O subsystems, database machines, graphic displays, voice/speech processing, image printing and data communications such as broadband coaxial links and fibre optics.

Data Processing Professionals

Here are 5 good reasons to live and work in Greensboro, North Carolina:

First, Climate:

In Greensboro, you get four moderate seasons. A long Indian Summer, with warm days and cool nights. A temperate winter—just enough snow to be pretty. And there's plenty of sunshine year-round.

Second, Cost-of-living:

You'll find this as moderate as our climate. Housing costs in Greensboro are 20% lower than the national average.

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We've got everything from well managed public schools to prominent colleges and universities. You'll also find a wide variety of schools specializing in exceptional children, college preparation, etc.

Fourth, Recreation & The Arts:

Greensboro has noted art galleries, famous golf courses, and plenty of tennis courts. All surrounded by beautiful parks, covering more than 2600 acres. Or, enjoy the nearby Atlantic Coastline and the Blue Ridge Mountains.

Fifth, (we saved the best till last), Gilbarco is here:

We're a dynamic subsidiary of Exxon, designing and producing precision fuel dispensing systems and monitoring instruments. And we're diversifying into many other areas. You'll find a unique blend of small company teamwork and big company resources.

We're currently looking for:

Systems Analyst Heavy experience in major systems design and implementation in a manufacturing environment. Working knowledge of ANS COBOL required. On-line systems preferred. Analyst/Programmer Two or more years experience in a manufacturing environment on an IBM 370 DOS/VS system with strong ANS COBOL on-line programming preferred. Programmer One-two years experience in producing and testing ANS COBOL programs from detailed specifications. Proficiency in DOS/VS JCL, on-line programming (ICCF/TSO) preferred.

For the above openings, a Bachelor's degree in Business Administration or Computer Science is desirable. We offer excellent salaries and benefits packages. For consideration, please send your resume including salary history to: Ms. Gail Payne, Employment Dept. CW-5-19, Gilbarco, P.O. Box 22087, Greensboro, N.C. 27420.

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Programmer I	to $18K	Systems Analysts	to $32K
Programmer II	to $22K	Software/IMS	to $35K
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Programmer/Anal	to $24K	Tech. Rep/Software	to $30K
Senior P/A	to $30K	Prog/Consultant	to $29K

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Software Engineers

Come to Maryland where the best is at Westinghouse

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Task Leaders

You will head up a three-to-five man software engineering team to develop computerized test and performance evaluation capabilities for large-scale, state-of-the-art integrated circuit systems.

Responsibility spans the entire development cycle, consisting of:
- Systems test definition
- Computer configuration evaluation and selection
- Software system definition
- Design
- Implementation
- Documentation
- User acceptance

You will work in a creative environment of team communications (concepts, requirements, and design reviews, code walkthroughs and hardware/software interfaces) utilizing programmer productivity development tools, such as structured analysis, structured design, and top-down implementation in an interactive time-share environment.

Creativity, organizational ability, and communications skills are essential. Useful experience includes real-time data acquisition, process control, and scientific analysis programming. FORTRAN, assembly language, COBOL, and data base knowledge are preferred. Major computer systems being utilized include:
- Honeywell level 66/06 mainframe (GCOS)
- DEC PDP-11/70 (RSX-11M)
- DEC VAX-11/780 (VMS)
- Various micro- and mini-computers imbedded in end-use systems

Project Team Members

Software engineers are also needed to perform as team members in the above areas.

Operating Systems Analysts

Applicants must have the following qualifications and experience:
- At least three years of Honeywell series 60 systems analysis experience.
- At least two years of GCOS operating system maintenance experience including the ability to:
  - Perform edits, cold booting, patch updates and GRTS generation.
  - Write and maintain user MME modules
  - Analyze master mode and user dumps to ascertain and correct errors.
- Working knowledge of FORTRAN, COBOL, and BASIC.
- In-depth knowledge of GMAP

All positions require a BS degree and you must be a U.S. citizen.

Located in suburban Baltimore, within easy access of the Baltimore and Washington metropolitan areas, ATL is the center for research and development for the Defense and Electronic Systems Center. Here, you can live in historic Annapolis, the new city of Columbia, the renewed metropolis of Baltimore or its beautiful suburbs. Enjoy the famous Chesapeake Bay with its nautical delights and seafood treasures; the lush Maryland horse country, or the winter pleasures of the nearby mountains and the summer pleasures of the Atlantic Ocean. Professionally, educationally, culturally . . . we have a lot to offer you.

CALL COLLECT

To discuss these career opportunities with technical management, call Roland Anders, collect, at 301/765-7279 or Clark Reddick at 301/765-7253, Monday–Friday, 9 A.M. to 4 P.M. If unable to call, please send resume, stating present salary, to:

R.A. Richmond, Dept. 736
Westinghouse
P.O. Box 1693
Baltimore, MD. 21203

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Westinghouse

An important message for Computer Programmers and Systems/Software Specialists in the Boston, Dallas, Houston, Los Angeles and San Francisco areas.

Your present job could be costing you money –find out free

"If your salary is equal to or higher than the salaries you see on these pages, you may think you're well paid. Don't be misled. Your job may be costing you money. Find out how. Send for my free kit, *The Insider's Guide to Computer Compensation.*"

Tom Ryan, President
Perry White & Associates, Inc.

Tom Ryan, President of Perry White & Associates, Inc. has helped thousands of data processing professionals find better paying jobs that offer greater earning potential.

In these times of economic uncertainty, it's more important than ever to make sure that you are getting the most out of your earnings potential.

You should be aware of ways that your job could be costing you money. And you should also know about the opportunities available to improve your total compensation package.

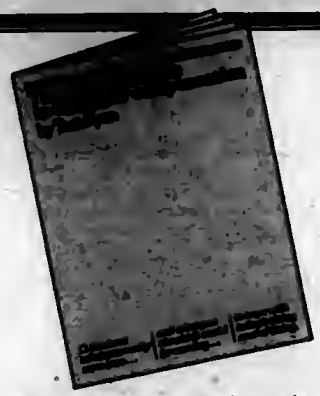
Here are just a few areas you should take a good hard look at before you conclude that you're being well paid in your present job.

Inflation – How do you keep ahead when inflation is running at the rate it is today? In terms of real dollars, are you making more, or less, than you were last year? How much of a raise do you need just to keep even with inflation? How should you plan to cope with inflation in the future?

Taxes – How can you manage to stay ahead of inflation when taxes eat up a large share of your salary increases? What happens when a raise puts you into a higher tax bracket?

Fringe Benefits – If you had to choose between more fringe benefits or a higher salary, which would you select? What would you base your decision on? Do your current employee benefits – medical plans, dental programs, special bonuses and the like – adequately cushion your salary against inflation and the tax bite?

Other factors you should consider – Does getting to work cost you more this month than



it did last month? And how much more than it did last year? Are you working – and living – in the part of the country you really prefer? Would you earn more in another area of the country? What should you expect beyond just the salary you're being paid?

Tom Ryan's *Insider's Guide to Computer Compensation* will help you answer these and dozens of other questions that will help you determine whether you are being paid what you're really worth. It will show you how your present job may be costing you quite a bit of money – in ways you're probably not even aware of. *The Insider's Guide to Computer Compensation* will aid you in evaluating your current earnings. *And* it will also be a great help in creating a workable plan for the future, a plan which will show you how to keep pace with the rising cost of living.

Also in this kit, you'll find sections like, "Computer Industry Salary Comparisons," which will tell you what your peers are earning. You'll find advice on when, and why a job change can work to your advantage – plus helpful hints about how to decide if a specific job is worthwhile for you. There's a proven way you can estimate the real value of compensation offered by an employer – as well as a guide to selecting the best paying employment opportunity – plus many other frequently overlooked factors that you must consider in order to get what you deserve for your valuable professional skills.

Call 800-447-4700 toll-free for *The Insider's Guide to Computer Compensation* – it's free.

Call now 800-447-4700 toll-free, and ask for *The Insider's Guide to Computer Compensation* – we'll send it to you with no obligation of any kind, and at no charge whatsoever. This 12-page, step-by-step guide includes a special section to help you evaluate your present compensation, and plan thoughtfully for your future. It will help you isolate and identify the economic factors and other vital considerations that affect what you're actually being paid.

When you know the facts, you may find that your job is costing you money. Find out now what compensation you should be receiving for your computer skills. Call today for your free guide, or if you prefer, mail the coupon below.

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☐ Computer Programmers
☐ Systems/Software Specialists

Name (please print)

Address

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CW518

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Los Angeles, CA 90010

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Santa Barbara
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MASSACHUSETTS
Boston

OKLAHOMA
Lawton (Ft. Sill)

VIRGINIA
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TELOS is a career-oriented company offering excellent salaries, attractive fringe benefits, plus personal and professional advancement. We seek individuals who share our appreciation for good performance and pride of workmanship, and are in the top 10% of the realtime/systems programming community. If you are truly serious about going places, please rush your resume to:

Penny Bevier, Telos Systems Development, 3420 Ocean Park Blvd., Santa Monica, CA 90405. (213)450-2424.

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Two Positions
- $22k/min 2 years RPG II experience
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- Salary range $15,604-$18,376 to start
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Apply: Personnel Office
Rapid City Hall
300 Kansas City Street
Rapid City, South Dakota 57701

AN EQUAL OPPORTUNITY EMPLOYER

Small, private college, located in the Black Hills of South Dakota area, with an enrollment of approximately 1000, needs Data Processing Instructor. Master's Degree is required. Must be knowledgeable in Basic, Fortran, and Cobol as a minimum. College uses an NCR 8430 computer with 512K memory. Send Vitaes/ resume to: Basil M. Hanks, National College, P.O. Box 1793, Rapid City, SD 57709.

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Applications are invited for a tenure-track, full-time assistant/associate teaching position in computer science, rank and salary dependent upon experience and qualifications, up to $20,340.00. Masters degree in computer science required, Ph.D. in computer science preferred. Background in industrial experience desirable. Applications accepted until position is filled. Send vita with names and telephone numbers and ad-dress of 3 references to Computer Science Search Committee, Ackley 303, Lock Haven State College, Lock Haven, Pennsylvania 17745. An affirmative action/equal opportunity employer

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Security Pacific Bank is one of the top ten banks in the United States and the second largest in California. Our history is one of consistent growth and our future will continue to include this growth. Will yours? At Security Pacific our professionals enjoy the opportunity for personal achievement and technical advancement. So analyze your future. It is time to make a change.

We have several immediate openings in our Glendale, California Operations Center.

NETWORK ANALYST

The analyst will design, implement and maintain telecommunication systems for the Bank and its 560 branch offices. Working knowledge should include data communications equipment such as (modems, multiplexers/concentrators) data test sets and data carriers. Telecommunications facilities/services, evaluation techniques and vendor/user interfacing skills are also required.

SENIOR NETWORK ANALYST

The senior analyst will design, analyze and implement data networks for the Bank and its 560 branch offices. This individual should be experienced in network configuration design, network performance analysis and network capacity management. Working knowledge should include protocols, network architecture, queueing theory and statistics. Educational background in computer science, math, E.E. or equivalent is desirable.

Send resume and salary history to:
SECURITY PACIFIC BANK, ADP Employment Division, Drawer T-026, 611 N. Brand Blvd., Glendale, CA 91203

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$18,000-$50,000

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MIS MANAGER to $36,000. "Fortune 200" corp needs MIS manager for Chicago area division. Manager all MIS functions w/functional responsibilities for remote facilities in progressive IBM state-of-the-art MIS environment. Must be degreed w/solid cobol programming beginning including 8 yrs of various levels of MIS exp. COPIC & 8100 skills a real plus. Refer BS.

MGR. SYSTEMS DEV. to $36,000. Leading Mid-Atlantic div of "Fortune 200" company seeks manager to design, dvlp & implement business systems. Degree w/8-10 yrs systems exp w/2-3 yrs supervisory exp. Modern IBM shop. Refer RN.

CONSULTING to $35,000. Atlanta service organization seeks individual from all disciplines to evaluate client needs; prepare recommendations; design systems. Req's 3/5 yrs heavy EDP bkgd in COBOL, DOS/OS. Atlanta based "fast track" growth organization. Refer RS.

SR. SYSTEMS to $35,000. Billion dollar prestige mfg corp. in choice VA location seeks Sr. Analyst w/exp in financial, accounting, payroll or inventory areas. Exceptional growth oppty. Refer DM.

MGT. SOFTWARE DEVELOPMENT to $35,000. "Fortune 500"/Systems Control div seeks supervisory candidate to direct development of distributed computer systems. Real-time process control environment. Ideal metro location. High visibility. Refer AT.

ANALYST to $30,000. We currently have numerous oppty's for Analysts & Programmers at most levels of exp. Financial & Manufacturing Systems pref. All costs paid by client co's Refer JS.

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Faculty position in software engineering, database design, information systems, and communication systems. Primary responsibility in undergraduate teaching. PhD in computer science or related field preferred. UALR is an urban university at the financial, industrial, and governmental center of the state. Contact Department of Mathematics and Computer Sciences, University of Arkansas at Little Rock, Little Rock, Arkansas 72204, an Affirmative Action employer.

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The Offices of Alumni Affairs and Development in Mississippi State University, Mississippi's largest university, seek programmer for new computer located in Alumni House to be operated for Alumni and Development programs. Will report to Director of Alumni Affairs.

Bachelors degree in computer science or related field desirable. Salary commensurate with experience. Send resume and references to Charles Weatherly, Director of Alumni Affairs, P.O. Drawer AA, Mississippi State, MS 39762 by June 10, 1980. Starting date June 16. An EEO/AA employer.

PROGRAMMER

Reynolds & Reynolds Co., Professional Systems Division, 1206 Spring St., Atlanta wants to hire Programmer/ Systems Analyst to design, implement, develop, maintain & document programs. Prepare functional process charts to describe existing and proposed operations. Intel 8080, Sourcepha 3800 & STI 3000 are used. Require B.S. degree in Computer Science. Salary $6.50 per hour/40 hour week. Qualified applicant contact Douglas S. Collins, Personnel Dept.

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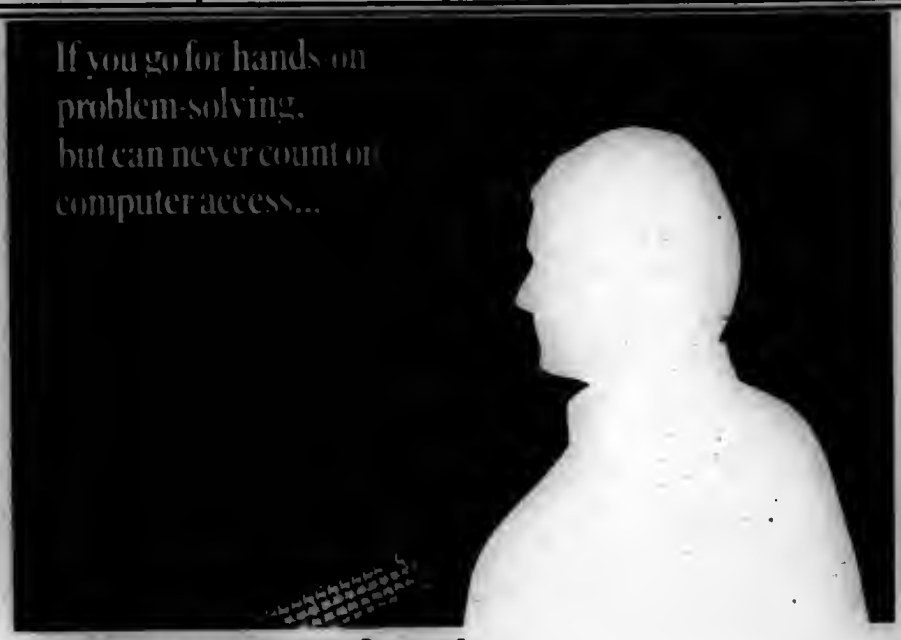

...have we got space for you!

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Now, about those groups: Hughes may be big, with more than 1,500 current projects in its $4 billion backlog. But we team professionals into small technical groups. This gives you the visibility and upward mobility of a little company. At the same time, you get the benefits of a giant corporation.

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If you're intrigued by unlimited space to learn, operate, and grow — in an environment offered only by Hughes here in this most comfortable part of the world — get your hands on more input from us. All it takes to get started is your resume addressed to:

Tom Royston 373/A300
Hughes Aircraft Company
Space & Communications Group
Professional Employment Dept. WC-SC
P.O. Box 92919
Los Angeles, CA 90009

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NEW HAMPSHIRE

Appealing? Tired of high taxes and co-processing jams? If so, growth and opportunities in NH has created new demands for E.P. Professionals. Immediate needs are for Programmer Analysts with a COBOL background along with Data Base, CICS, and DL/1 knowledge. Experience doesn't really matter. Other positions for Systems Analysts and Management Personnel exist as well. For consideration on any of these positions, forward your resume or call: David J. Dupont, CEC, Vice President.

CIVICABILITY
Personnel Consultants
100 S. River Rd., Bedford, NH 03102
(603) 668-4440
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APPLICATION PROGRAMMER
Cody, Wyoming

Husky Oil, a fully integrated oil company, has an immediate opening in its Cody, Wyoming office for an Application Programmer with 2- 4 years experience. IBM experience preferable, data base desirable.

If your lifestyle could include a small city in the Rocky Mountain west, please send your resume and salary history to:

C. Ed Hall
Manager of Human Resources

Husky Oil Company
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Cody, Wyoming 82414
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Husky

COLORADO!

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- Business Systems — distribution, insurance, manufacturing, banking
- Engineering Systems — finance, dynamics, stress, structures, petro-chemical
- Hardware — digital and analog circuit design, electronics packaging, components parts, electrical power
- Software Dual Systems — CSCSC, COPES, MSCS

Positions include excellent compensation and benefits programs, offering significant career development potential and job stability in the stimulating Colorado environment. Persons qualified for any of the above positions are invited to submit a resume of experience, or may call (303) 794-5555. Local interviews can be arranged.

TECHNICAL SUPPORT CONSULTANTS, INC.
5777 So. Lowell, Suite 210
Denver, CO 80123
An Equal Opportunity Employer M/F/V/H

SYSTEMS PROGRAMMERS
Florida Positions

Individuals with the following qualifications are needed for immediate employment in the Florida area.

SOFTWARE DESIGNER - Knowledge of I/O Drivers, realtime communications, IBM front-end design, 16-byte minis, 2 to 3 years' experience, degree required.

SOFTWARE INSTALLERS - DBMS or IMS Data Base.

SYSTEMS PROGRAMMERS MICROPROCESSORS - Intel 8080, develop I/O Drivers, diagnostics, and software test tools. Telephony experience required.

SENIOR SYSTEMS PROGRAMMERS - Mini-computer manufacturing, operating system development, diagnostics, process control, communications and networking. 5 to 15 years' experience, degree required.

SYSTEMS PROGRAMMERS - Heavy MVS internals. Must have 2 to 3 years' current experience.

MANAGER TECH SUPPORT - Heavy software experience and management ability in an IBM 370, OS/MVS, CICS, IMS environment.

If you have a sincere interest in relocating to Florida, and advancing your career, these positions offer excellent opportunities, full benefits and paid relocation. Interested parties please contact Josh Burke at (305) 942-5670, or send resume to:

DATA PROCESSING DIVISION
900 No. Federal Hwy., Suite 224
Pompano Beach, Fla. 33062

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PITTSBURGH, PA COMPUTER TECHNICAL SUPPORT

Dresser Industries, Inc. is one of the world's leading suppliers of high technology products and services to international energy, natural resources and industrial markets. Sales exceed $3 billion.

From it's inception in 1972, Dresser Computer Center has grown from two 360/ 50's to two 6 megabyte 3033's and one 3 megabyte Amdahl. Additionally, a 3 megabyte 370/168 system supports software development activities of the Technical Support Group. About 56,000 people are employed worldwide.

SYSTEMS PROGRAMMERS

With varying levels of experience in evaluating, generating and maintaining MVS Operating systems, JES, TSO and supporting hardware/ software.

CPE SPECIALIST

With varying levels of experience in technical and financial evaluations of hardware and software, performance measurement and tuning using hardware/software monitors on large scale IBM Systems.

COMMUNICATIONS SPECIALISTS

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LOS ANGELES INTERVIEWS

Racal-Milgo will be holding local interviews from 10:00 AM to 6:00 PM daily, Sunday, May 18, through Wednesday, May 21. To set up an appointment, call Bruce Czarniak collect at: (714) 750-3131.

See the complete Racal-Milgo product line on display at the National Computer Conference in Anaheim, Monday, May 19, through Thursday, May 22.

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The Myer Emporium Ltd., Australia's largest Departmental Store Group and one of the World's largest Merchandising Companies, have commissioned what is the most exciting and challenging Data Processing Development in the NATIONAL COMPUTING NETWORK. Melbourne, Australia's Second City is to be developed as the "Information Capital of the Air" for Australasia. The Information Systems Division is now in the process of accommodating these developments with the installation of two IBM 3033 Processors and the implementation of the Strategic Systems.

Many key people are needed NOW to participate in the planning, development and implementation of this project. Locations will be at the new Regional Data Centre in Melbourne where MVS/XA operates on IBM 3081 and 3033 under MVS/JES 3 with TSO, CICS and IMS software, etc.

COMPANY INFORMATION:
The Myer Emporium was established in 1925 and currently employs 29,000 people in 160 stores and 2500 locations. The company is comprised of four profit centres:

- Myer Department Stores
- Target Australia (Mass Merchandising Division)
- Target Supermarkets (Food Chain)
- Myer Shopping Centres (Property Development Division)

Their revenue for 1979 was $A1.15 Billion with planned annual revenue increases, hence the need to greatly increase their information processing capabilities.

ABOUT MELBOURNE, AUSTRALIA:
Melbourne is the second largest capital city in Australia renowned for its sophistication, corporate headquarters, superb restaurants, cultural centre and also being the capital of Australian football. It is built on a beautiful bay offering superb boating.

Positions Available:

SENIOR CONSULTANTS AND PROJECT MANAGERS
A number of positions are available that offer unique opportunities in both Management and Consulting roles. Successful candidates will come from differing environments, however, experience with a combination of some or all of the following will be necessary:-

- DP Consulting
- Management of Project teams
- Formulation of Systems development strategies
- Preparation of estimates and proposals
- "State of the Art" software and systems
- Client/USER interface

Candidates will have from 12 - 20 years experience in the DP industry, good presentation and communication skills combined with the ability to relate to executive staff levels.

Realistic career paths are offered that could include both consulting and project management, leading to line management or senior technical positions.

Remuneration will be by way of a package comprising a salary, company car, generous benefits and $A60,000 to $A80,000 should be taken as a guide.

SYSTEMS CONSULTANTS AND PRODUCT LEADERS
To initially carry out investigations and install for an On-Line Application System, then take the responsibility for leading a team of analysts and programmers through the design, development and implementation stages. The essential skills needed should include; previous project leadership of one major On-Line Data Base Systems, a minimum of 5 years as an Analyst, Data Base Administrator, Manager, Senior Designer of IBM 3033X hardware plus BDM/70, PC/70 software would be ideal.

Remuneration will be by a salary package comprising excellent executive benefits and $A60,000 to $A85,000 should be taken as a guide.

PROJECT TRAINEE
As the strategic plan to development a large number of D.P. professionals will be offered technically and financially rewarding career positions as Analysts, Programmers, Network Engineers, Control Specialists, etc. If you have in excess of five years recent practical experience with Retail and/or Commercial Applications, On-Line and Data Base Systems, plus exposure to an IBM Strategic Software environment, then you should also apply now.

Myer's remuneration and benefits policies are among the most competitive in Australia and reflect the importance of the project.

GENERAL
All successful candidates MUST have a current AUSTRALIAN "PERMANENT RESIDENCE" VISA or will have their "Permanent" visa within one month or be an Australian wishing to return to Australia. Relocation costs will be met by Myer for successful candidates and their families to Melbourne. We would like to stress the URGENCY of this assignment and press you to immediately reply to Battles and Associates.

ACTION
Battles and Associates of Sydney, Recruitment and Search Consultants since 1871, have been appointed International Search Consultants for the Myer Emporium. All replies should be written immediately and sent by EXPRESS MAIL to the Joint Managing Director, Kevin D. Howard, of Battles and Associates marked "MYER".

A recruitment team from Australia will then visit potential candidates to make final selections, job offers and arrange travel to Australia.

All replies will be treated in the strictest of confidence.

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Experience in OS/MVS, operating system internals in an environment including JES 2, VSAM, CICS and IMS. Data communications software experience with VTAM and Network Control is also desired.

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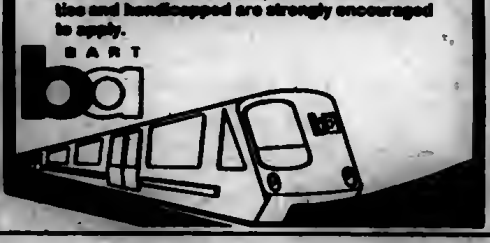
BART



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WED Enterprises is the masterplanning, design engineering and development division of Walt Disney Productions. WED's team of "imagineers" creates and develops overall planning concepts for all new theme park attractions and outdoor entertainment projects and unique transportation systems.

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Our Electronic Engineering department is seeking Senior Engineers with a BSEE/Computer Science degree and 3-5 years of applied technology and industry experience. Candidates selected will participate in our 2-month training program to get up immediate interviews with the Technical Staff for in-depth discussions on our projects which range from microprocessor control design to a broad spectrum of systems level engineering.

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Qualified applicants should possess at least three years experience in a hands-on environment with mini-computers on Real Time applications. A degree in a technical area is preferred but not mandatory. Basic General purpose skills is a plus. Your assignment will be with a small staff developing computer based systems for Walt Disney World, Disneyland, Tokyo Disneyland and Houston Postmaster projects.

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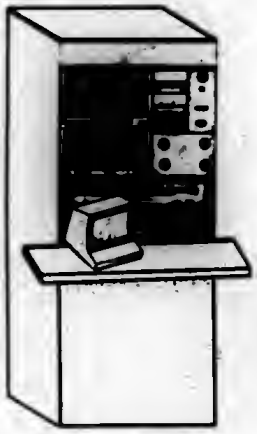

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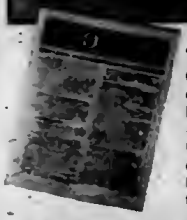

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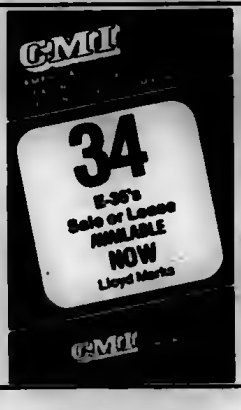

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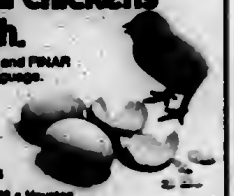

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